

## Original Article

# JAAM Nationwide Survey on the response to the first wave of COVID-19 in Japan. Part I: How to set up a treatment system in each hospital

Jun Oda,<sup>1,2</sup> Seizan Tanabe,<sup>1,3</sup> Tetsuro Nishimura,<sup>1,4</sup> Takashi Muguruma,<sup>1,5</sup> Shigenari Matsuyama,<sup>1,6</sup> Yoko Sugawara,<sup>1,7</sup> and Shinji Ogura<sup>1,8</sup>

<sup>1</sup>Labor Management Committee, Japanese Association for Acute Medicine (JAAM), Tokyo, <sup>2</sup>Department of Emergency and Critical Care Medicine, Tokyo Medical University, Shinjuku, <sup>3</sup>Foundation for Ambulance Service Development, Emergency Life-Saving Technique Academy of Tokyo, Tokyo, <sup>4</sup>Department of Traumatology and Critical Care Medicine, Graduate School of Medicine, Osaka City University, Osaka, <sup>5</sup>Advanced Critical Care and Emergency Center, Yokohama City University Medical Center, Yokohama, <sup>6</sup>Department of Emergency and Critical Care Medicine, Hyogo Emergency Medical Center, Kobe, <sup>7</sup>Department of Emergency and Critical Care Medicine, Tokyo Saiseikai Central Hospital, Tokyo, and <sup>8</sup>Department of Emergency and Disaster Medicine, Gifu University Graduate School of Medicine, Gifu, Japan

**Aim:** To clarify how the medical institutions overcame the first wave of coronavirus disease 2019 (COVID-19) in Japan and to discuss its impact on the medical labor force.

**Methods:** We analyzed questionnaire data from the end of May 2020 from 180 hospitals (102,578 beds) certified by the Japanese Association for Acute Medicine.

**Results:** Acute (emergency) medicine physicians treated severe COVID-19 patients in more than half of hospitals. Emergency medical teams consisted of acute medicine physicians and other specialists. Frontline acute care physicians were concerned about their risk of infection in 80% of hospitals, and experienced stress due to a lack of personal protective equipment. Twenty-six of the 143 hospitals that had a mental health check/consultation system in place indicated that there was a doctor who experienced mental health problems. Of the 37 hospitals without a system, only one hospital was aware of the presence of a doctor complaining of mental health problems.

**Conclusion:** Acute care physicians and physicians in other departments experienced high levels of stress as they fought to arrange COVID-19 treatment teams and inpatient COVID-19 wards for infected patients. Medical materials and equipment may be sufficient for a second or third wave; however, active support is needed for the physical and mental care of medical staff. Mental health problems may be missed in facilities without mental check and consultation system.

**Key words:** COVID-19, medical staff, mental care system, survey

## INTRODUCTION

THE WORLD HEALTH Organization declared the coronavirus disease 2019 (COVID-19) outbreak a global pandemic on March 10, 2020.<sup>1</sup> Five days later, France<sup>2</sup> and other European governments declared a lockdown. The United States urged citizens to limit their travel on March 16, 2020.<sup>3</sup> In Japan, confirmed COVID-19 cases increased at

the end of March,<sup>4</sup> and the Prime Minister of Japan proclaimed a state of emergency to seven prefectures on April 7 due to more than 400 new infections/day. The state of emergency was expanded to cover the entire nation on April 16 due to an increased number of patients (approximately 600 new infections/day). As the number of new infections decreased toward the end of May, the state of emergency was lifted on May 25.

All medical staff in Japan either provided medical treatment directly to COVID-19 patients or were affected by the virus indirectly. In particular, acute (emergency) medicine physicians, intensivists, infectious disease experts, and pulmonologists were active in this outbreak. Above all, acute medicine physicians worked exceedingly hard because they

**Corresponding:** Jun Oda, MD, Department of Emergency and Critical Care Medicine, Tokyo Medical University, 6-7-1, Nishishinjuku, Shinjuku 160-0023, Tokyo, Japan. E-mail: odajun@gmail.com.

Received 12 Sep, 2020; accepted 12 Nov, 2020

were on the front lines dealing with emergency patients who were possibly infected with COVID-19.

In this study, we aimed to clarify how medical institutions addressed the first wave of COVID-19 and how it affected the medical labor force and the mental distress. We performed a survey and distributed it to acute care medical centers certified by the Japanese Association for Acute Medicine (JAAM).

## METHOD

### Surveyed hospitals and time allotted for responses

THE JAAM IS the academic clinical society for acute medicine and has approximately 11,000 members. The JAAM constructed a system of board certification for acute medicine physicians and certifies acute medical centers with well-developed track record of emergency care and suitable for the training of acute medicine physicians. Of the approximately 3,000 secondary emergency medical facilities in Japan, 513 are certified as acute medicine medical centers by the JAAM. These hospitals were included in the survey study. Time allowed for responses was from June 8 to 27, 2020.

### Questionnaire and form

1. The survey was constructed using Google Forms and each institution submitted answers through the website.

All fields were mandatory except the questions about ideas for improvement at each hospital

Location, number of beds, category of institution, emergency medical care system, specified hospital fee for critical patients, number of acute medicine physicians.

2. Hospital system designated to treat COVID-19

Task force in hospital, guideline setting, business continuity plan (BCP), infection control team/system, outpatient management for fever or person traveling abroad, severity of COVID-19 wards, specialty of attending doctor, management of hospital beds, number of beds for COVID-19 patients, situations when medical treatment was restricted, competency.

3. Initial medical treatment system

Protection from infection in the emergency room, availability of polymerase chain reaction/antigen examination system, treatment of suspected patients infected with the COVID-19 virus, number of suspected infected patients, what is considered an advantage of acute medicine physician against COVID-19.

4. Medical equipment

Supply and demand of personal protective equipment and medical equipment.

5. Overworked medical staff and a care system for them

Stress identifying system and mental health care in the hospital, sources of stress, overtime work, management of work shift/support system among departments, factors related to surviving the first wave, contributions to prefecture/regional medical control system.

6. Outcome of COVID-19 patients

Number of hospitalized patients of each severity, discharge, transfer, still hospitalized, worsening, death.

### Description and analysis

As for patient severity, moderately severe patients were defined as those who required oxygen administration and severe patients were defined as those who required ventilator assistance, extracorporeal membrane oxygenator, or the management in an intensive care unit (ICU). Among 180 hospitals surveyed, we compared the hospitals ( $n = 130$ ) which had 5 or more mild to moderate inpatients or at least one severe inpatient to other hospitals ( $n = 50$ ) to evaluate the burden placed on the hospitals with COVID-19 patients, and to understand the medical labor force and weight placed on acute medicine physicians. Chi-square examination was performed to test differences between the two groups.

## RESULT

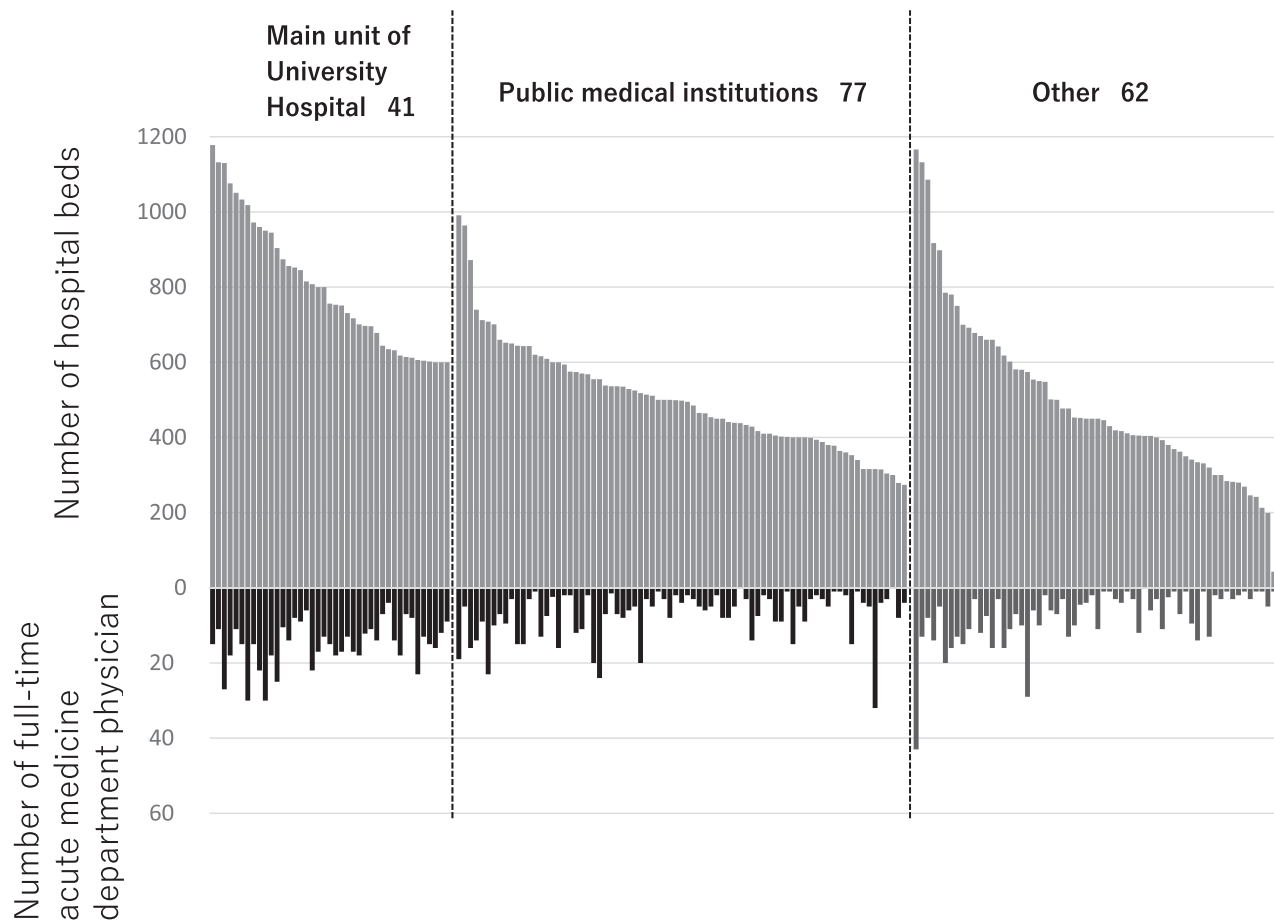
### Characteristics of the hospitals

A TOTAL OF 180 hospitals completed the survey form. Figure 1 shows the number of hospital beds (43–1,178, total of 102,578 beds) and full-time physicians working in each acute medicine department of each hospital, by category. Part-time physicians were calculated based on the proportion of time worked. The main units of university hospitals are core facilities for advanced medical treatment. Public medical hospitals include flagship hospitals and Japanese Red Cross Medical Center. A total of 143 hospitals had more than 400 beds. There were 107 hospitals that reported having less than 10 acute medicine physicians. By contrast, complete day/night coverage existed for acute medicine physicians in 102 hospitals.

As much as 55 of these 180 hospitals were those designated for specified infectious diseases and 34 were cooperating institutions for specified infectious diseases.

### In-hospital emergency medical care system before and after COVID-19

Before COVID-19, in 95% of hospitals, walk-in patients (initial emergency) and secondary emergency patients



**Fig. 1.** Characteristics of the hospitals. Each bar represents one hospital. Gray (upward) bars and black (downward) bars indicate the number of hospital beds and the number of full-time acute medical department physicians, respectively.

(mostly transported by ambulance) were treated in the department of acute medicine. In approximately 80% of hospitals, the department treated tertiary emergency patients (critical care) not only in an emergency room but also in an emergency ICU or surgical ICU. A BCP was prepared in 113 hospitals, of which 42 hospitals (23%) have already prepared a BCP which included an infectious disease pandemic.

After COVID-19, 168 hospitals (93%) developed independent practice guidelines for COVID-19, and 16 of them were produced by the acute medicine department.

### Outpatient for fever or person traveling abroad

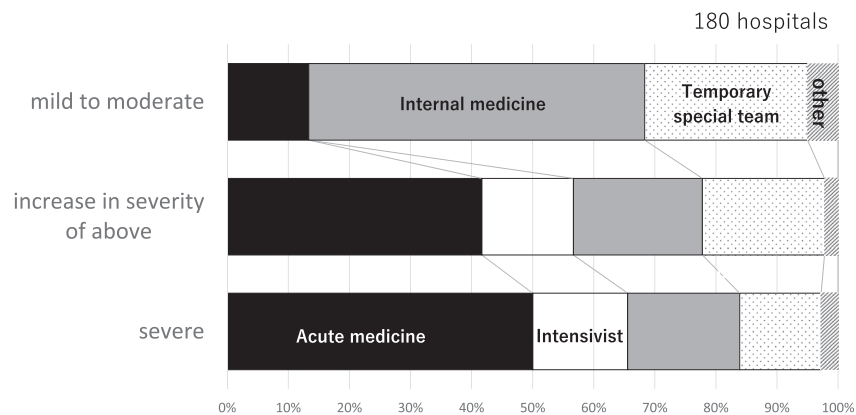
Both outpatient for fever and person traveling abroad were treated by internal medicine physicians specializing in infectious disease and/or pulmonology (63 hospitals, 35%),

followed by the doctors in acute medicine departments (30 hospitals, 17%). In 54 hospitals (30%), a temporary special team was developed.

### Preparation of ward for COVID-19 inpatients

As preparation for an inpatient unit for COVID-19 patients with infections of mild to moderate severity, 45 hospitals (25%) converted a current infectious disease ward to a specific ward for COVID-19 patients, whereas 66 (37%) used a different ward as the ward for COVID-19 patients. Other hospitals designated a portion of the ward for infectious diseases (14, 8%) or a portion of another ward (22, 12%). Private rooms were reserved for severe patients (17, 9%). Eleven hospitals could not accept hospitalization.

Figure 2 shows the specialty or department of the physicians tending to COVID-19 inpatients. For the mild to moderate severity group, department of internal medicine



**Fig. 2.** Specialty or department of the physicians attending for coronavirus disease 2019 (COVID-19) inpatients in 180 hospitals.

attendings cared for the patients in 99 hospitals, and severe patients requiring critical care were cared for by the department of acute medicine in 90 hospitals.

### Medical labor force and the condition of physicians

As shown in Figure 3A, overtime for acute medicine physicians was increased in 40% of hospitals. Some of them worked more than 100 h extra per month.

In the group of hospitals with five or more mild to moderate inpatients, or one or more severe inpatients, a greater number of additional acute medicine physicians were required to work extra daytime or night shifts, or both (Fig. 3B).

In this group, there was higher risk of close contact to infected patients (Fig. 4A). A higher number of hospitals with physician's close contact with COVID-19 patients and infection had overtime working (26 overtime working/48 with close contact physician versus 46/132 without close contact,  $P < 0.05$ ). Figure 4B shows the issues causing acute medicine physicians to feel stressed. More than 80% of hospitals were affected by concerns of infection risk to themselves or their families, and more than 50% of hospitals experienced difficulties with self-physical management and a lack of medical materials and equipment. One-third of hospitals reported there were concerns based on a difference in perspective (among departments) of treating COVID-19 patients or because administrators were involved in the treatment of patients as well. Physician burnout and extreme stress due to critical care were more felt in the hospitals with at least five mild to moderate inpatients or one severe inpatient.

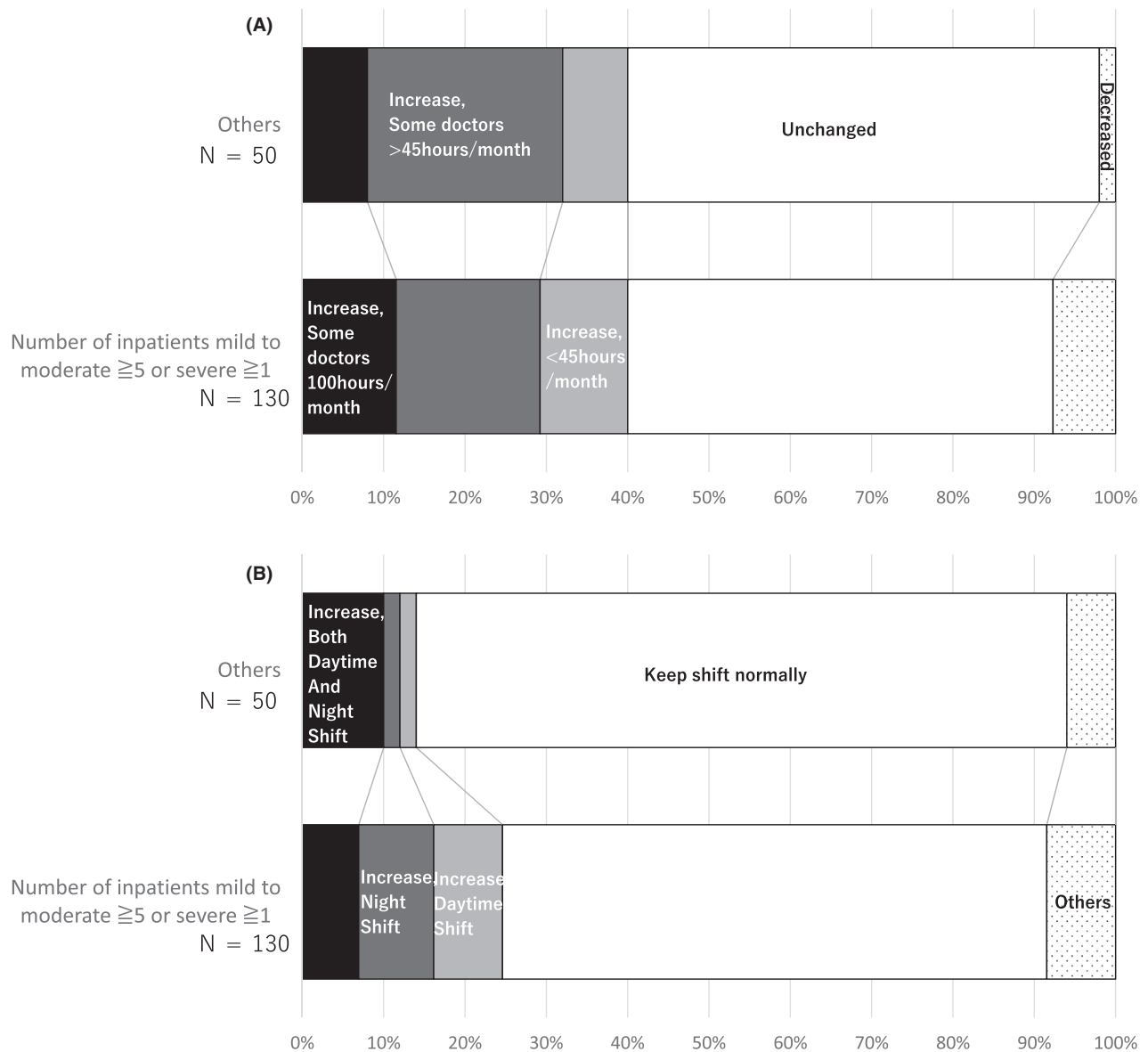
### Team building for COVID-19 inpatient and the support to the medical staff in each hospital

Team building and clinical support system development among the departments treating COVID-19 inpatients are shown in Figure 5. There were support systems between acute medicine and other departments in 108 hospitals (60%). In 62 hospitals (34%), treatment was performed by acute medicine doctors only. More hospitals had a system of cooperation in which hospital groups assisted those which had more inpatients.

Considerations offered by each hospital to medical staff treating COVID-19 patients are shown in Figure 6. Accommodation was provided for medical staff treating COVID-19 patients in 106 hospitals (59%). The number was larger in hospitals having more inpatients. Taking a day off and ensuring access to the nursery was offered by 31 (17%) and 41 (23%) hospitals, respectively.

Data on the number of hospitals providing stress management and assistance are presented in Figure 7.

As much as 26 of the 143 hospitals that had a mental health check and consultation system in place indicated that there was a doctor who complained of mental health problems. Of the 37 hospitals without a system, only one hospital was aware of the presence of a doctor complaining of mental health problems, which was significantly lower than the above (Table 1). No correlation was observed between the existing physicians complaining of mental illness and the increase in overtime working in each facility, the number of full-time acute medicine physicians, or having at least five mild to moderate inpatients or one severe inpatient.



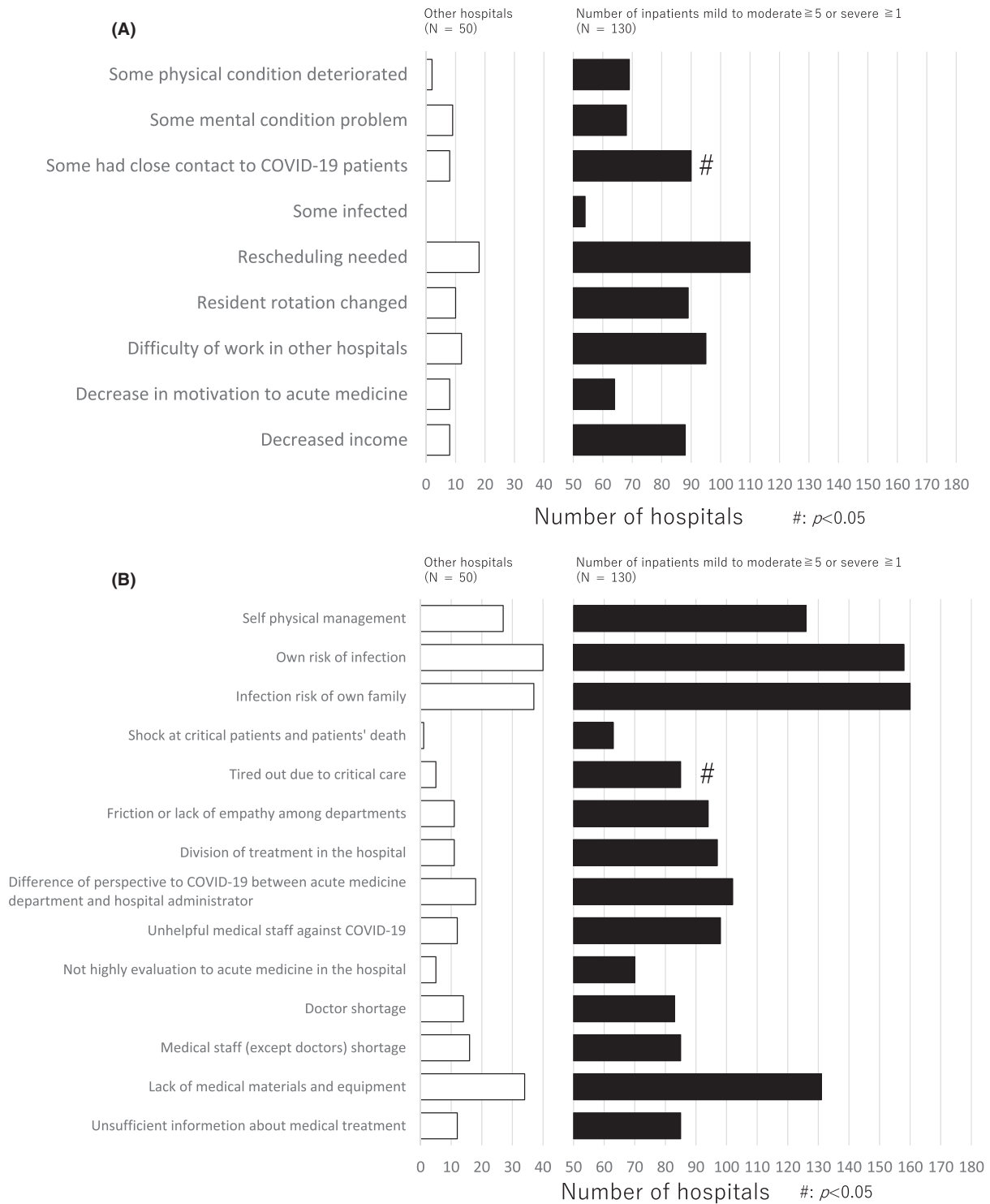
**Fig. 3.** Shift work changes (overtime for acute medicine physicians [A] and extra daytime or night shifts [B]) after coronavirus disease 2019 (COVID-19). The lower bar shows the hospital group ( $n = 130$ ) which had at least five mild to moderate inpatients or one severe COVID-19 inpatient and the upper bar shows the other hospitals ( $n = 50$ ) in both A and B.

## DISCUSSION

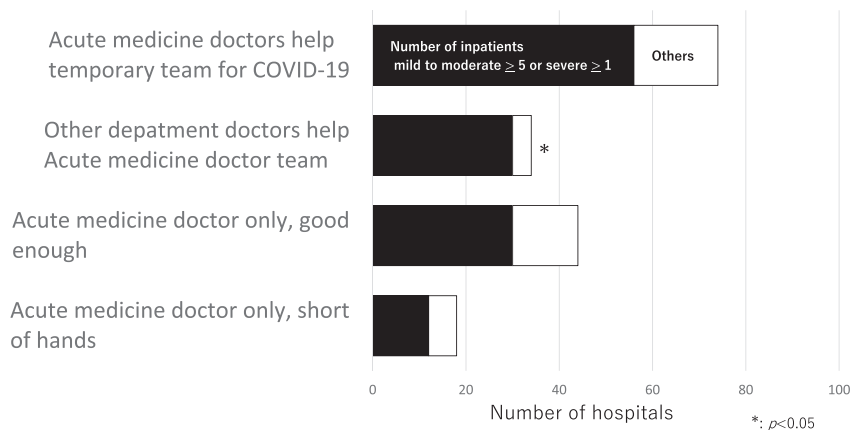
AT THE END OF May, through great effort, Japanese people overcame the first wave of COVID-19. This study is the first nationwide survey distributed to acute medicine medical centers certified by the JAAM. To describe how the hospitals addressed COVID-19 infections and the labor of medical staff is invaluable when preparing for next wave. In this study, we obtained

data from 180 flagship hospitals having acute medical centers which consist of over 100,000 hospital beds (Fig. 1).

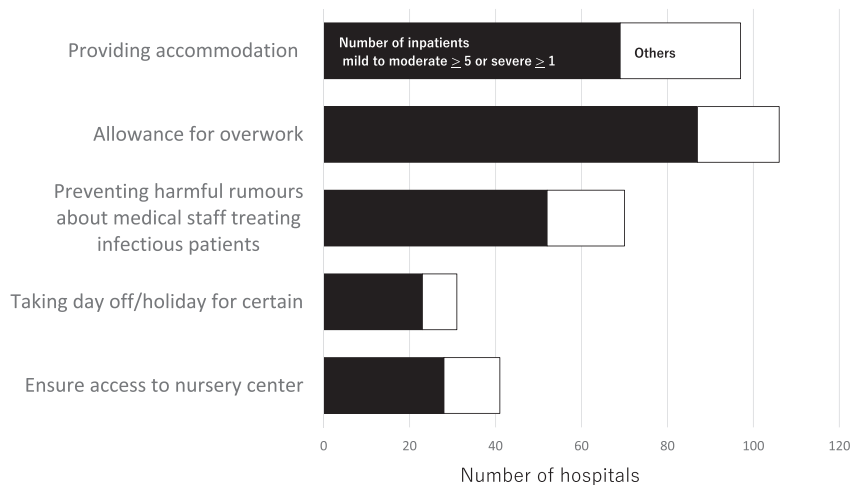
In Japan, acute medicine physicians work not only as emergency physicians and critical care physicians, but also as acute care surgery physicians and intensivists during acute phases of emergency severe patients.<sup>5</sup> Thus, they cover a wider array of cases, which is characteristic of this specialty in this country.



**Fig. 4.** A, The condition of acute medicine physicians. The solid bar indicates the hospitals which had at least five mild to moderate inpatients or one severe coronavirus disease 2019 (COVID-19) inpatient ( $n = 130$ ) and the white bar indicates other hospitals ( $n = 50$ ). B, Stressors experienced by acute medicine physicians.



**Fig. 5.** Team creation and clinical support systems among the departments treating coronavirus disease 2019 (COVID-19) inpatients. Hospitals which had five or more mild to moderate patients or one severe patient are indicated by the solid portion of the bar ( $n = 130$ , total) and the white portion indicates other hospitals ( $n = 50$ , total).



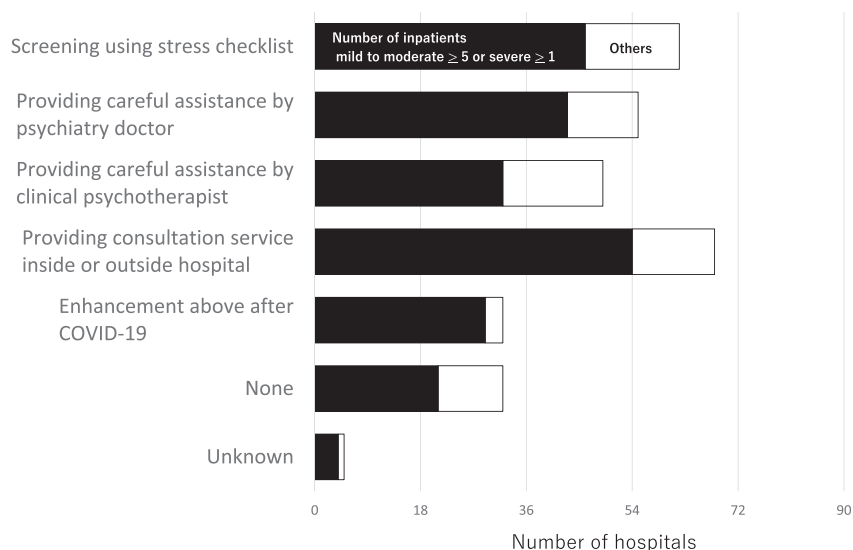
**Fig. 6.** Considerations offered by each hospital for medical staff treating coronavirus disease 2019 (COVID-19) patients. Hospitals which had five or more mild to moderate patients or severe patient are indicated by the solid portion ( $n = 130$ , total) and the white portion indicates other hospitals ( $n = 50$ , total).

For mild to moderate COVID-19 infections, internal medicine doctors and temporary treatment teams tended to the inpatients in most hospitals. When patients worsen during hospitalization, acute medicine physicians or intensivists treat these patients in more than half of the hospitals. In half of the hospitals, acute medicine doctors provide critical care to severely ill inpatients (Fig. 2). There is no description of who or which department is tending to COVID-19 outpatients and inpatients regarding each level of severity.

To follow the labor of attending physicians and their departments is critical in terms of not only labor management but also medical quality control. In the hospitals where acute medicine physicians cared for COVID-19 patients, a greater number of additional acute medicine physicians were

required to work extra daytime/night shifts (Fig. 3B), and temporary medical specialty teams for COVID-19-infected patients consisted of physicians from the acute medicine department and as well as other departments, at least in the hospitals that treated more inpatients (Fig. 5). We should also recognize that the existence of overtime was most associated with the presence of physicians with close contact with COVID-19 patients.

Regarding the stress experienced by medical staff during treatment of COVID-19 patients, there is a report that more than one-third of the medical staff suffered insomnia symptoms during the outbreak.<sup>6</sup> However, according to another study,<sup>7</sup> the University hospital in Wuhan reported that the frequency of burnout among medical staff treating



**Fig. 7.** Stress management and assistance provided in hospitals. Hospitals which had five or more mild to moderate patients or at least one severe patient are indicated by the solid portion ( $n = 130$ , total) and the white portion indicates other hospitals ( $n = 50$ , total). COVID-19, coronavirus disease 2019.

**Table 1.** Mental health check/consultation system and the number of physicians who suffered from mental health problems

Stress check and/or consultation system	Yes ( $n = 143$ )	No ( $n = 37$ )
Number of hospitals, some doctors suffered from mental health problems	26 (18.2%)	1 (2.7%)
Other than the above	117 (81.8%)	36 (97.3%)
		$P = 0.0108$

uninfected patients in their usual wards was as high as front-line staff treating COVID-19 patients. In this study, physical conditions deteriorated more in those with close contact with infected patients in the acute medicine department when caring for COVID-19 inpatients than in others (Fig. 4A).

It was reported that 4,824 health workers have been infected and at least 23 Italian doctors have died during the coronavirus epidemic in Italy,<sup>8</sup> which became intensely stressful for medical staff. For acute medicine physicians, their own risk of infection and risk of infection to their families were addressed by most hospitals. Lack of medical materials and equipment occurred in over 60% hospitals at the same time, which was also experienced in hospitals where physicians other than acute medicine doctors cared for COVID-19 inpatients (Fig. 4B). In many hospitals temporary treatment teams were created, and many issues such

as a difference of perspective, unhelpful colleagues from another department, inequities of roles, and friction/lack of empathy among departments were experienced by physicians in many hospitals.

The importance of stress screening and presence of a support system for the medical staff is emphasized.<sup>9,10</sup> Mansoor *et al.* suggested a referral pathway for staff mental health during the COVID-19 pandemic, which was limited only by resources.<sup>11</sup> In our study, many hospitals already had a mental care system and this was enhanced during this time. Only 32 hospitals (18%) had no mental health screening at their institution. It is worth noting that only a small number of hospitals without a mental health check and consultation system were aware of the presence of a doctor complaining of mental health problems. Mental health problems may be missed in facilities without mental check and consultation system.

To decrease anxiety and other mental health disorders, overtime pay and providing accommodation and healthcare support were provided by only half of all hospitals. Sadly, the children of medical workers in Japan were excluded from daycare over virus fears,<sup>12</sup> and this decreased the number of available medical staff because they lost access to childcare. Forty-one (23%) hospitals could ensure access to nursery centers (Fig. 6) by themselves.

A limitation of this survey is that it was requested only of medical doctors rather than all medical staff (e.g., nurses, pharmacists, clinical engineers, physical therapists, medical social workers). Second, because this was a short-term



survey, response rate was below 40%. However, this study obtained responses from 43 prefectures and these were well-represented except for four (i.e., Akita, Ehime, Niigata, and Toyama) and each category of university hospitals, public medical institutions, and others was represented, so we consider that this study reflects conditions across Japan.

In this nationwide survey, mild to moderate and severe patients were primarily treated by internal medicine physicians and acute medicine physicians, respectively. Emergency medical teams consisted of acute medicine physicians and other specialists. When hospitals accepted five or more COVID-19 inpatients (and a few hospitals that accepted fewer inpatients) had to convert general wards and the ICU into COVID-19 wards and COVID-19 ICU ward, which restricted elective surgeries and non-COVID-19 emergency patients. Frontline medical staff were exposed to the risk of infection and stressful environments. Medical materials and equipment may be sufficient in the coming second or third wave, however, active support for medical staff and their physical and mental health needs will be required.

## ACKNOWLEDGMENTS

**WE APPRECIATE ALL** those who have supported this survey regardless of commitments and demands on frontline staff (supplementary file Appendix S1) and those who have provided valuable advice such as the executive board members of the JAAM. The authors thank Enago (www.enago.com) for the English language review.

## FUNDING INFORMATION

**NO FUNDING INFORMATION** provided.

## DISCLOSURE

Approval of the research protocol with approval No. and committee Name: Approved by the board members of the JAAM.

Informed Consent: N/A.

Registry and the Registration No. of the study/Trial: N/A.

Animal studies: N/A.

Conflict of interest: None declared.

## REFERENCES

- 1 World Health Organization. Archived: WHO Timeline - COVID-19 [updated April 2020; cited 20 Aug 2020]. Available from: <https://www.who.int/news-room/detail/27-04-2020-who-timeline--covid-19>

- 2 France 24. Macron announces 15-day lockdown in French 'war' on coronavirus [updated March 2020; cited 20 Aug 2020]. Available from <https://www.france24.com/en/20200316-live-france-s-macron-addresses-nation-amid-worsening-coronavirus-outbreak>
- 3 The New York Times. Trump urges limits amid pandemic, but stops short of national mandates [updated March 2020; cited 20 Aug 2020]. Available from: <https://www.nytimes.com/2020/03/16/us/politics/trump-coronavirus-guide-lines.html>
- 4 Ministry of Health, Labour and Welfare. About coronavirus disease 2019 (COVID-19) [updated August 2020; cited 20 Aug 2020]. Available from [https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/newpage\\_00032.html](https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/newpage_00032.html)
- 5 Hori S. Emergency medicine in Japan. *Keio J. Med.* 2010; 59: 131–9.
- 6 Zhang C, Yang L, Liu S *et al.* Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front. Psychiatry.* 2020; 11: 306.
- 7 Wu Y, Wang J, Luo C *et al.* A comparison of burnout frequency among oncology physicians and nurses working on the frontline and usual wards during the COVID-19 epidemic in Wuhan, China. *J. Pain. Symptom. Manage.* 2020; 60: e60–5.
- 8 CNN. At least 23 Italian doctors have died in coronavirus epidemic [updated March 2020; cited 20 Aug 2020]. Available from [https://edition.cnn.com/world/live-news/coronavirus-outbreak-03-23-20-intl-hnk/h\\_8df53475be78f0280ae6eebe098885a](https://edition.cnn.com/world/live-news/coronavirus-outbreak-03-23-20-intl-hnk/h_8df53475be78f0280ae6eebe098885a)
- 9 Chen Q, Liang M, Li Y *et al.* Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet. Psychiatry.* 2020; 7: e15–6.
- 10 Huang J, Liu F, Teng Z *et al.* Care for the psychological status of frontline medical staff fighting against COVID-19. *Clin. Infect. Dis.* 2020; ciaa385. <https://doi.org/10.1093/cid/ciaa385>.
- 11 Mansoor M, Najam S, Nadeem T *et al.* Integrating mental health in COVID-19 crisis: Staff mental health referral pathway. *Asian J. Psychiatr.* 2020; 54: 102339.
- 12 The Japan Times. Children of nurses in Japan excluded from day care over virus fears [updated April 2020; cited 20 Aug 2020]. Available from <https://www.japantimes.co.jp/news/2020/04/25/national/children-nurses-japan-excluded-day-care-coronavirus/#.XzzL4zVUuZQ>

## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. Flagship hospitals with acute medical centers that cooperated in this nationwide survey.