Original Article

Workplace responses to COVID-19 and their association with company size and industry in an early stage of the epidemic in Japan

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Abstract

Objectives: The aim of the study was to investigate the number of workplace measures implemented to respond to the COVID-19 epidemic reported by employees and their association with company size and industry among employees in Japan. **Methods:** A cross-sectional online questionnaire survey was conducted of full-time employees in Japan from March 19–22, 2020. Questions were about announcements by the company of measures taken and 23 items of workplace measures. Associations of company size and industry with the announcements and the number of workplace measures were analyzed. **Results:** The final sample consisted of 1,379 respondents. The mean number of implemented preventive measures for COVID-19 among 23 items was 11.2 (standard deviation, 5.9). Proportions of respondents who reported receiving announcement of measures taken was high (79.9%), as were proportions of respondents reporting implementation of some of the workplace measures, while the less than half reported implementation of most of the workplace measures. The announcement of measures and the number of workplace measures that were implemented in the workplace were generally lower/smaller among respondents in smaller companies and in retail, wholesale, and transportation industries. **Conclusions:** While most respondents reported receiving information about measures by their companies/organizations, it may be a further challenge to implement workplace measures in smaller companies and companies in retail, wholesale, and transportation industries.

Keywords: COVID-19, infection, prevention, public health, SARS-CoV-2, worksite

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Key points

- It was previously unclear what proportion of employees were aware of workplace measures responding to COVID-19.
- Most respondents reported receiving an announcement and experienced implementation of some workplace measures.
- Need to improve workplace measures in smaller companies/organizations and in retail, wholesale, and transportation industries.

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Introduction

The epidemic of coronavirus disease 2019 (COVID-19), a respiratory disease caused by SARS-CoV-2, began in Wuhan, China at the end of 2019, and has spread to most continents of the world¹⁾. The World Health Organization declared a pandemic on March 11, 2020²⁾. The epidemic in Japan started in mid-January 2020, and the number of patients increased dramatically in March³⁾. The Japanese government took community-based measures to prevent the epidemic, such as quarantining, encouraging people's prevention practices, restricting travel and events, and encouraging social distancing⁴⁾, as was also done in other countries⁵⁾.

Measures and actions taken by companies and organizations could prevent their employees from contracting COVID-19 and also slow down the spread of COVID-19 in the community. In an earlier experience with breakouts of influenza, workplace social distancing measures were effective in reducing influenza transmission⁶⁾. A workplace policy to allow sick employees to take leave was associated with less chance of getting infected in Japan⁷⁾ and the United States⁸⁾. Based on these previous experiences and theoretical expectations based on the nature of the transmission, the United States Centers for Disease Control (CDC) released an interim guideline for preparedness for COVID-19 that included educating employees about preventive actions (such as hand washing), keeping sick employees at home, making it possible to work at home, reducing business travel, and avoiding social gatherings⁹⁾. In Japan, the Japan Society for Occupational Health, in conjunction with the Japanese Society of Travel Medicine, released similar guidance to prepare for COVID-19 in the workplace¹⁰⁾.

In the past outbreak of influenza A (H1N1) pdm09 in 2009, it was reported that 30–40% of large companies implemented measures and another about 60% planned to do so¹¹⁾. However, it was unclear what proportion of companies/organizations currently implemented specific measures to respond to the COVID-19 epidemic. It also was not clear how equally the measures were implemented among companies/organizations depending on their characteristics, such as size and industry. No report has been made on how much company size or type of industry affected the implementation of the measures to date. Small-sized companies/organizations may have difficulty in implementing these measures; companies/organizations in some types of industry (e.g., the service sector industry) may be able to apply less implementation of the measures. This information would be useful in planning further strategies to promote workplace responsiveness to COVID-19.

The aim of the present cross-sectional study was to investigate the proportion of full-time employees in Japan whose companies/organizations implemented the workplace measures to prevent COVID-19, at the time immediately after the Expert Committee of the Japanese government reported on March 19, 2020 that a huge outbreak could still be possible and people should avoid close conversation in a crowded and closed space. We surveyed an Internet sample of full-time employees in order to quickly assess the current status of the workplace measures in the whole of Japan. We also investigated the differences in the implementation of workplace measures according to the size and industry of companies/organizations where the employees worked.

Methods

Study design

This was a cross-sectional study of participants in online panel surveys of full-time employees in Japan, conducted from March 19–22, 2020. This study was approved by the Research Ethics Committee of the Graduate School of Medicine/Faculty of Medicine, University of Tokyo (No. 10856-(2)). At the time of our survey conducted (as of March 21, 2020), the cumulative numbers of COVID-19 patients in Japan and the world were 1,046 and 292,142, respectively, and still increasing; the cumulative numbers of death due to COVID-19 were 36 and 12,783, respectively, with a case fatality rate of 1.44 per one million population globally¹²⁾.

Participants

Participants were recruited from about 500,000 potential participants, representing all prefectures in Japan, who registered with an online survey company. For a baseline survey in February 2019, a total of 4,120 full-time employees were invited to respond to an online questionnaire until the targeted sample size was obtained, with an equal number of participants for each of eight groups based on sex (male and female) and age groups (20–29, 30–39, 40–49, and 50–59 years old). The inclusion criteria were (a) living in Japan, (b) aged 20–59 years, and (c) currently employed. There were no exclusion criteria. From March 19–22, 2020, these participants were again invited to take part in an online questionnaire survey.

Procedure

The Internet survey company sent an invitation to participants of a baseline survey in 2019 (N = 4,120). Participants accessed a company website and completed the online questionnaire. Participants received small token as a reward.

Measurements

Workplace measures to respond to COVID-19: Information delivery by company (notifications and announcements)

Participants were asked about the announcement of measures taken by the company for the prevention of COVID-19 by one question, “Has any information (notifications or announcements) been sent from the company to employees regarding this new coronavirus infection?”, with the response options of “Yes,” “No,” or “Unknown.” The variable was dichotomized into a “Yes” or “No” group by assigning the answer of “unknown” into the “No” group.

Workplace measures to respond to COVID-19: Preventive workplace measures

An original scale was used to ask about preventive

measures that had been implemented at the workplace. The scale was developed using a consensus-based recommendation of workplace measures to respond to a breakout of novel influenza in Japan¹³⁾ as the basis, together with other information sources, and through a discussion among occupational physicians (NS, RK, and NK) who engaged in responding to COVID-19 at workplace. The final scale included 23 items of a variety of workplace measures to respond to COVID-19, consisting of seven categories: (a) prevention to be taken by individuals (5 items); (b) prevention to reduce the risk of infection at the workplace (8 items); (c) criteria and procedures for waiting at home and for clinical contact (4 items); (d) temporary leave when infected or in a pandemic (3 items); (e) information about consideration for high-risk people (1 item) who may have greater severity and complications, such as older¹⁴⁾ and pregnant workers¹⁵⁾ based on earlier publications; (f) introduction of reliable information resources (1 item); and (g) information on the duration of special measures (1 item). Each item was asked with response options of “newly implemented this time,” “normally implemented,” “not implemented,” or “not applicable for my work.” The last response option was not used for items (a) prevention to be taken by individuals. The response was dichotomized: respondents who answered “newly implemented this time” or “normally implemented” were categorized into a “Yes” group; respondents who answered “not implemented” or “not applicable for my work” were categorized into a “No” group. We calculated the number of the workplace measures with a “Yes” response, ranging from 0 to 23.

Demographic variables

A questionnaire also assessed demographic characteristics of respondents, including sex (male or female), age, and occupational type (managers, non-manual, or manual), and characteristics of the companies/organizations where they worked, such as company size and type of industry. The type of industry was classified into 14 groups using Japan Standard Industrial Classification by Ministry of Internal Affairs and Communications as a reference¹⁶⁾: manufacturing; information and technology services; retail and wholesale business; finance, insurance, real estate; professional and technical services; eating/drinking, hotel business, life-related services and entertainment; education and learning support; medical and welfare; transportation; construction; agriculture and industry; public service; and others. The company size of the total numbers of employees in their company (not included the grouped companies) was classified into four groups: 1,000 or more, 300–999, 50–299, or fewer than 50 employees per company/organization). Geographical area of residence of respondents was classified into seven blocks (i.e., Hokkaido, Tohoku, Kanto, Chubu, Kansai [Kinki], Chugoku/Shikoku, and Kyushu/Okinawa).

Statistical analysis

First, descriptive analysis was undertaken to examine the frequency in the whole sample of announcement of measures taken by the company and of each of 23 workplace measures taken to respond to COVID-19. Second, frequencies of announcement of measures taken and the number of workplace measures implemented were compared among the groups classified on the basis of the company size and type of industry. A binary multiple logistic regression was conducted to determine the association between the company-size groups and announcement of measures taken, fully adjusting for covariates (sex, age, and industry), and estimating adjusted odds ratios (AORs) and 95% confidence intervals (CIs) compared to the groups with 1,000 or more employees. Analysis of covariance was used to compare the number of workplace measures implemented across type of industry, adjusting for covariates (sex, age, and company size) with estimating adjusted means and standard errors (SEs), and p value for the significant differences compared to the manufacturing group. Statistical significance was set as a two-sided $p < 0.05$. SPSS 26.0 (IBM Corp., Armonk, NY, USA). The ONEWAY, CROSSTABS, LOGISTIC REGRESSION and UNIANOVA of the Japanese version of SPSS were used. Post-hoc statistical power calculation was made using the G*Power 3 program^{17,18)}.

Results

A total of 1,488 respondents (response rate: 35.1%) completed the survey in 2020. We excluded unemployed respondents ($n = 27$) and respondents who reported their company size as unknown ($n = 42$). The final sample consisted of 1,379 respondents. The participants' characteristics are shown in Table 1. The average age was 41.2 years old (standard deviation, 10.5; range, 21–60). The types of industry were manufacturing (24.3%), medical and welfare (13.8%), retail, wholesale business (10.3%) and others in descending order. One-third responded that their company size was 1,000 or more employees (33.1%). Non-manual workers comprised 62.6% of the sample.

Frequencies of implementation of preventive measures for COVID-19 are presented in Table 2. Most respondents (79.9%) reported that announcements were made by their companies about COVID-19. The proportion of workplace measures implemented related to encouraging (a) prevention taken by individuals (over 70% for 4 of 5 items), but lower for temperature measurement (48.5%). Among items related to (b) prevention to reduce the risk of infection at the workplace, the proportion was highest for cancel or postpone internal or external business events (60.5%), while the proportions were smaller for other items. Among items related to (c) criteria and procedure for waiting at home and clinical contact, most (76.4%) respondents received a request to refrain from

Table 1. Participants' characteristics (N = 1,379)

	N (%)	Mean (SD) [min–max]
Sex		
Male	698 (50.6)	
Female	681 (49.4)	
Age		41.16 (10.5) [21 – 60]
20–29 years old	264 (19.1)	
30–39 years old	376 (27.3)	
40–49 years old	355 (25.7)	
50–59 years old	361 (26.2)	
≥ 60 years old	23 (1.7)	
Type of industry		
manufacturing	336 (24.3)	
medical and welfare	190 (13.8)	
retail and wholesale business	142 (10.3)	
finance, insurance, real estate	113 (8.2)	
public service	111 (8.0)	
information and technology services	100 (7.3)	
life-related services and entertainment	100 (7.2)	
professional and technical services	81 (5.9)	
transportation	60 (4.4)	
education and learning support	53 (3.8)	
construction	51 (3.7)	
eating/drinking, hotel business	21 (1.5)	
agriculture and industry	6 (0.4)	
others	15 (1.1)	
Company size		
≥ 1,000 employees	456 (33.1)	
300–999	229 (16.6)	
50–299	377 (27.3)	
< 50	317 (23.0)	
Occupational type		
Managers	125 (9.1)	
Non-manual	863 (62.6)	
Manual	391 (28.4)	
Geographic block		
Hokkaido	65 (4.7)	
Tohoku	93 (6.7)	
Kanto	524 (38.0)	
Chubu	246 (17.8)	
Kansai (Kinki)	254 (18.4)	
Chugoku & Shikoku	93 (6.7)	
Kyushu & Okinawa	104 (7.5)	

SD, standard deviation.

going to work when ill, and related information, while a smaller proportion (24.4%) received a request to wait at home if they had a history of staying abroad. For items related to (d) temporary leave when infected or pandemic, less than half received relevant information. One-third (33.0%) of respondents reported that they were informed by company about the duration of these special measures. A modest proportion (33.0–42.9%) reported receiving (e) information about consideration for high-risk people, (f) introduction of reliable information resources, and (g)

information on the duration of special measures. Almost all respondents reported receiving any of these workplace measures implemented in their companies (96.7%). The average number of workplace measures implemented almost normally distributed (skewness = −0.035; kurtosis = −0.856), while Kolmogorov–Smirnov test indicated a statistically significant deviation from the normal distribution (KS = 0.056, $p < 0.001$). The mean number of workplace measures implemented was 11.2 (standard deviation, 5.9).

Table 2. Frequencies of implementation of preventive measures for COVID-19 by companies, reported by Japanese workers (N = 1,379)

	N	%
Information delivery by company (notifications and announcements)	1,102	79.9
Workplace measures to respond to COVID-19		
(a) Prevention taken by individuals		
Hand washing, gargle enforcement	1,211	87.8
Encouraging finger alcohol disinfection	1,190	86.3
Encourage wearing masks	1,106	80.2
Enforce cough etiquette	1,090	79.0
Enforcement of temperature measurement	669	48.5
(b) Prevention to reduce the risk of infection at workplace		
Cancel or postpone internal or external business events	834	60.5
Disinfection of the work environment	560	40.6
Refrain from traveling overseas	483	35.0
Restrictions on eating, drinking, and entertainment for work	478	34.7
Enforcement of staggered work	456	33.1
Encourage telework and telecommuting (including remote work)	369	26.8
Changing the working environment (desk layout, flow lines, etc.)	237	17.2
Restrictions on the use of employee cafeterias	197	14.3
(c) Criteria and procedure for waiting at home and clinical contact		
Request to refrain from going to work when ill	1,053	76.4
Report request for fever	972	70.5
Dissemination of information on home remedies and consultations for COVID-19	839	60.8
Waiting at home if you have a history† of staying abroad	336	24.4
(d) Temporary leave when infected or pandemic		
Providing information on how to deal with infected cases in the workplace	795	57.7
Providing information on compensation when waiting at home	500	36.3
Provision of information on compensation when taking leave due to infection	487	35.3
(e) Information about consideration for high-risk people		
Consideration for staff who are at high risk of serious illness in case of infection (elderly people, pregnant women, etc.)	549	39.8
(f) Introduction of reliable information resources		
Announcement of reliable information collection destinations (such as the Ministry of Health, Labor and Welfare website)	591	42.9
(g) Information on the duration of special measures		
Providing information on how long special measures will be taken	455	33.0
Implementation of preventive measures (any)	1,333	96.7
	Mean (SD) [min–max]	
The number of preventive measures among 23 items	11.2 (5.9) [0 – 23]	

† The item was not restricted to any countries or any period about the history of staying abroad.

In general, the workplace measures in the category (a) were already prepared more frequently than the other measures; for the other categories, most measures were newly implemented (Appendix). For most measures, the proportions of being already prepared and newly implemented were greater in larger companies than smaller ones; the differences were more prominent for the categories other than (a). Measures in the category (a) were more likely to be already prepared in medical and welfare

industry; measures in the category (b), (c) and (e) were more likely to be newly implemented in information and technology service; measures in the categories (d) and (f) were more likely to be implemented in public service; the categories (g) measure was implemented more in public service and medical and welfare.

Table 3 shows the frequencies of announcement of measures taken and the number of workplace measures, classified by their company size and industry. Company

Table 3. Frequencies of implementation of preventive measures for COVID-19 by company size and type of industry (N = 1,379)

	Information delivery by company			Number of preventive measures	
	N	n (%)	AOR (95% CIs) †	Crude mean (SD)	Adjusted mean (SE) ‡
Company size					
> 1,000 employees	456	424 (93.0)	1.00	14.5 (5.1)	13.9 (0.3)
300–999	229	201 (87.8)	0.55 (0.32–0.94)*	12.7 (5.1)	12.2 (0.4)**
50–299	377	297 (78.8)	0.28 (0.18–0.43)**	10.1 (5.3)	9.7 (0.3)**
< 50	317	180 (56.8)	0.09 (0.06–0.15)**	6.8 (5.0)	6.6 (0.3)**
Test for difference		$\chi^2 = 163.3$, $p < 0.001$		$F = 152.1$, $p < 0.001$	
Type of industry					
manufacturing	336	268 (79.8)	1.00	12.2 (6.6)	11.3 (0.3)
medical and welfare	190	158 (83.2)	1.92 (1.15–3.19)*	11.3 (4.2)	11.8 (0.4)
retail and wholesale business	142	103 (72.5)	1.08 (0.65–1.77)	8.8 (5.9)	9.6 (0.4)**
public service	111	102 (91.9)	2.96 (1.38–6.36)**	13.2 (4.3)	12.1 (0.5)
finance, insurance, real estate	113	98 (86.7)	1.52 (0.80–2.90)	12.6 (6.2)	11.4 (0.5)
information and technology services	100	90 (90.0)	2.48 (1.19–5.19)*	13.7 (5.3)	12.9 (0.5)**
life-related services and entertainment	100	69 (69.0)	0.81 (0.47–1.40)	9.5 (6.1)	10.0 (0.5)*
professional and technical services	81	60 (74.1)	1.26 (0.68–2.32)	9.3 (5.9)	10.0 (0.6)*
transportation	60	41 (68.3)	0.59 (0.31–1.13)	8.8 (5.5)	8.4 (0.7)**
education and learning support	53	46 (86.8)	2.15 (0.89–5.18)	11.7 (5.0)	11.6 (0.7)
construction	51	37 (72.5)	1.10 (0.53–2.27)	9.12 (5.9)	9.9 (0.7)
eating/drinking, hotel business	21	16 (76.2)	1.15 (0.37–3.57)	10.1 (5.7)	10.2 (1.1)
agriculture and industry	6	1 (16.7)	0.10 (0.01–0.99)*	5.3 (5.9)	7.8 (2.1)
others	15	13 (86.7)	3.92 (0.81–18.83)	9.8 (5.5)	11.2 (1.3)
Test for difference		$\chi^2 = 58.59$, $p < 0.001$		$F = 9.20$, $p < 0.001$	

AOR, adjusted odds ratio; CI, confidence interval; SD, standard deviation; SE, standard error.

† Estimating adjusted odds ratios and the 95% confidence intervals using multiple logistic regression on gender, age, company size, and industry.

‡ Estimated means and standard errors (SEs) using analysis of covariance on gender, age, company size, and industry.

* $p < 0.05$, ** $p < 0.01$, significant difference from the first category

size was significantly associated with announcement of measures taken, with respondents in smaller companies having less chance of receiving such an announcement ($\chi^2 = 163.3$, $p < 0.001$). Respondents in smaller companies also experienced a significantly fewer number of workplace measures implemented ($F = 152.1$, $p < 0.001$). Among the types of industry, using manufacturing as a reference, a significantly higher proportion of announcement of measures taken was observed in information and technology services (AOR 2.48; 95% CI, 1.19–5.19), medical and welfare (AOR 1.92; 95% CI, 1.15–3.19), and public service (AOR 2.96; 95% CI, 1.38–6.36). The number of workplace measures implemented was significantly greater in information and technology services ($p < 0.01$), and significantly smaller in retail and wholesale business and transportation ($p < 0.01$), compared to manufacturing. The proportion of announcement of measures taken and the number of workplace measures implemented were not significantly different between men and women and among age groups in the crude or multivariate analyses ($p > 0.05$). The proportion of the announcement (chi-square = 17.8, $df = 6$, $p = 0.007$) and the average number

of workplace measures ($F = 3.42$, $df = 6$, $p = 0.002$) were significantly different among the geographic blocks, with being greater in Hokkaido, Kanto, and Kansai. Detailed results for gender, age group, and geographic blocks are available upon request.

Post-hoc statistical power calculation

For the chi-square test on proportion of announcement of measures taken, the statistical power obtained in this sample ($n = 1,379$) was 0.89 and 0.66 for company size and type of industry, respectively, assuming that alpha was 0.05 and effect size (w) was small (0.1)¹⁹⁾ that was equivalent to having about 1.3–1.6 times difference, respectively, between the highest and lowest groups. For the analysis of variance (F test) on the number of workplace measures implemented, the statistical power obtained in this sample was also 0.89 and 0.66 for company size and type of industry, respectively, assuming that alpha was 0.05 and effect size (f) was small (0.1)¹⁹⁾ that was equivalent to 10% of the total variance explained by the variables.

Discussion

Most respondents (79.9%) reported that they received an announcement of measures taken by their company or organization about COVID-19. However, one-fifth of the respondents did not receive an announcement from the company or organization of workplace measures to respond to COVID-19. An effort is still needed to promote the actions of companies and organizations to deliver an announcement to their employees of measures taken about COVID-19. Among specific workplace measures, a wide variety of the proportions of implementation was observed. The proportions were generally higher for encouraging prevention behaviors taken by individuals, promoting social distancing (canceling or postponing internal or external business events), refraining from going to work when ill, and providing information on how to deal with infected cases in the workplace than other groups of measures. On the other hand, the other items were implemented only modestly: reducing the risk of infection at workplace, requesting waiting at home if they had a history of staying abroad and temporary leave when infected or in a pandemic, providing information about consideration for high-risk people, introducing reliable information resource, and providing information on the duration of special measures. These measures were probably implemented depending on the risk of infection, working condition, and available resources in each company, as supposed from observed variations of the measures taken by company size and type of industry. However, it would be desirable to implement the workplace measures in a more comprehensive way, considering various actions to respond to COVID-19. Providing a comprehensive checklist to cover all these actions to companies and organizations may be effective in enhancing the quality of workplace measures implemented.

The proportions of the specific workplace measures in this study were much greater than figures reported in a previous study that only 30–40% of large companies in Japan implemented measures at most in the past outbreak of influenza A (H1N1) pdm09 in 2009¹¹⁾, suggesting that companies implemented preparedness plans after the outbreak. In addition, most workplace measures of categories were newly implemented other than encouraging prevention behaviors taken by individuals. Hand hygiene and cough etiquette, use of alcohol-based hand sanitizer, social distancing, and paid sick leave were often reported as workplace measures responding to past outbreaks of influenza A (H1N1) in the literature^{20,21)}. The pattern was similar to our findings. A difference is that vaccination programs used in the past outbreak was not applicable to the current outbreak of COVID-19.

Smaller companies were less likely to make the announcement to their employees of measures taken and they implemented fewer measures. Smaller companies

may have limited resources to respond to COVID-19: no health care professionals, limited human resources for managing health risks; and less chance of receiving relevant information from outside. Prefectural Occupational Health Promotion Centers, regional occupational health centers²²⁾, and private occupational health service organizations²³⁾ are encouraged to disseminate relevant information and guidance to properly respond to COVID-19 to small- and medium-sized enterprises (SMEs). In addition, local offices of the Chamber of Commerce and Industry could also provide relevant information to SMEs. The proportion of the announcement and average number of the workplace measures was greater in geographic blocks where the epidemic of COVID-19 was prominent (i.e., Hokkaido, Kanto, and Kansai)²⁴⁾, possibly reflecting the levels of awareness in the community. A community-based approach lead by the local government may be also affective to promote the measures in SMEs.

Information and technology services, medical and welfare, and public service showed more announcements of measures taken; information and technology services showed the greater number of workplace measures implemented. These industries may be more aware of the importance of taking measures to respond to COVID-19. For instance, medical and welfare industry already implemented some of the measures before the COVID-19. This is because health care workers have been a major target for prevention in previous infection outbreaks²⁵⁾. In the information and technology services industry, it may be easier to apply a social distancing measure, such as working from home. On the other hand, the number of workplace measures implemented was smaller in retail and wholesale business, and in transportation, compared with the manufacturing industry. Retail and wholesale businesses usually have small, and often many separate workplaces. It may be difficult to establish a policy for responding to COVID-19 and implement it in all workplaces. In the transportation industry, it is not easy for an employee (e.g., driver) to take a leave when sick. There is a need to develop a set of measures specifically applicable to this type of industry, such as managing a closure of some workplaces and giving the autonomy to take measures specific to each workplace, based on a well-organized preparedness plan. Trade associations could provide good practices, which can be implemented based on industry-specific conditions, to respond to COVID-19 to companies/organizations in the same industry.

Limitations

The present study used a sample recruited from an Internet survey company, and the follow-up rate to the initial sample was low (35%). The sampling framework was not specifically designed to look at the differences by company size or type of industry. The sample may be biased and caution is needed in generalizing the find-

ings to the whole working population in Japan. All the information was collected as self-report. The study may underestimate the implementation of workplace measures if respondents did not know all measures implemented in the company depending on their position and status or understand these measures correctly. The present study was based on responses from individual employees, not companies/organizations. It should be noted that the findings did not show the proportion of companies/organizations. The proportion may be overrepresented by respondents from larger companies/organizations. The present findings should be replicated in a survey of companies/organizations. In addition, the scale of workplace measures was developed based on a consensus-based guide from a previous experience of outbreaks of infectious diseases. All the measures asked in the scale may not necessarily evidence-based in preventing COVID-19 infection. Using an analysis of covariance may not be appropriate because the distribution of the number of measures implemented was not exactly normally distributed. The study was based on a cross-sectional survey at a single point of time during an early stage of the breakout of COVID-19 in Japan. We could not adjust for socioeconomic status of the respondents that might confound the association between company size and type of industry with the measures. The findings may be different at early, middle, and late stages of the epidemic.

Conclusion

This study revealed that most employees received an announcement of measures taken by their company or organization about COVID-19. Most respondents reported that their companies/organizations took any measure to protect against COVID-19. In particular, individual preventive measures (e.g., hand washing) were recommended to employees in the early phase of the epidemic in Japan. However, a wide variety was found in proportions of specific workplace measurements. In addition, a further effort is needed to promote the implementation of workplace measures in smaller companies and companies in retail and wholesale and transportation industries.

Conflict of Interest Disclosures

None reported.

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Role of the Funder/Sponsor

The sponsors had no role in the design and conduct of the study; collection, management, analysis, and inter-

pretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Approval of the research protocol

This study was approved by The Research Ethics Committee of the Graduate School of Medicine/Faculty of Medicine, The University of Tokyo (No. 10856-(2)).

Author contribution

NK was in charge of this study, of supervising the process and of providing his expert opinion on the subject. NS and NK organized the study design and analyzed the data. Collaborators (RK and KT) ensured that questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved. All authors contributed to the process of conducting the survey. NS and NK wrote the first draft of the manuscript, and all other authors revised the manuscript critically. All authors approved the final version of the manuscript.

Supplementary material

This article contains supplementary material (Appendix), which is available in the online version (doi: 10.1539/eohp.2020-0007-OA)

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