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Original Study

Adherence to Personal Protective Equipment Use in Home-Care Service Agencies During COVID-19 in Japan: A Cross-Sectional Survey



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A B S T R A C T

Keywords:

Infection prevention and control
home-care service
home-care aide
personal protective equipment

Objectives: To assess adherence to personal protective equipment (PPE) use among home care workers during usual care at the agency level during the COVID-19 pandemic in Japan and determine whether agency-level action toward infection prevention and control (IPC) is associated with adherence to PPE use.

Design: A nationwide cross-sectional study.

Setting and Participants: Home care service agencies in Japan were randomly selected from all agencies nationwide.

Methods: An online survey was conducted between January and February 2021. The administrators at home care service agencies responded to the following items: adherence to PPE (disposable masks, gloves, and aprons) use during diaper change among their home care workers, agency-level actions toward IPC, including monitoring of infection outbreak among users, existing manual for IPC, training opportunities on IPC for care workers, and other agency and administrator characteristics.

Results: Of the 1942 agencies, 197 were included in the analysis (response rate: 10.1%). Although 145 (73.6%) of the agencies always used both masks and gloves during diaper change, 32 (16.2%) agencies fully adhered to wearing masks, gloves, and aprons. Agencies monitoring infectious disease outbreaks among service users were more likely to adhere to PPE use (adjusted odds ratio: 5.97, 95% confidence interval: 1.30–27.31).

Conclusions and Implications: Low adherence to PPE use, especially apron use, during diaper change among home care service agencies during the COVID-19 pandemic in Japan was revealed, despite the widespread availability of a manual for IPC and/or training opportunities. To ensure safety and quality home care services for both users and home care workers, agencies should not simply create manuals or training systems as a structure; instead, they should implement effective processes for appropriate PPE use.

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Home care services, which include helping with everyday activities, such as bathing and dressing, meal preparation, and household tasks, are essential for older adults with diseases and/or disabilities to enable them to live in their homes. The number of people with complex medical conditions and disabilities in the community is increasing, and 5%–12% of patients develop infections that lead to

hospitalization.^{1,2} Infection prevention and control (IPC) in home care settings has, thus, become an important issue in hospitals.

Home care workers who provide assistance with activities of daily living (ADL) or instrumental ADL (IADL) in users' homes are also vulnerable to various occupational hazards.^{3,4} Exposure to blood and/or stool is a common occupational hazard because of the nature of their work.³ Reports in 2007 and 2008 by the Centers for Disease Control and Prevention in the United States (US) recommended appropriate IPC practices, including standard precautions, such as using personal protective equipment (PPE) and hand hygiene, in home care settings.^{5,6} However, studies in the US have reported that adherence to appropriate IPC practices, especially PPE use among

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home care nurses, has been limited.^{7–9} Few have assessed the quantitative adherence to PPE use among home care workers, such as home care aides and nonhealth care professionals.

Patient safety climate at the agency level is related to home care workers' individual perception of patient safety.¹⁰ To increase adherence to PPE use among home care workers, the agency's action toward IPC, including PPE availability and training for appropriate PPE use, is important.^{4,11,12} The coronavirus disease 2019 (COVID-19) pandemic has deteriorated the situation surrounding PPE use among health care professionals worldwide,^{13,14} and this has become even worse in home care settings. Qualitative studies reported that home care workers prioritized PPE use; however, they faced a serious shortage of PPE supplies during the COVID-19 pandemic.^{12,15,16} Thus, a quantitative evaluation of adherence to PPE use during the COVID-19 pandemic in home care services is necessary.

In Japan, adherence to PPE use in home care settings was a challenge even before the COVID-19 pandemic.^{17,18} After the pandemic, the Ministry of Health, Labor, and Welfare reminded home care service agencies to implement standard precautions, including appropriate PPE use during normal care, especially when there is contact with blood or body fluids, as recommended prior to the COVID-19 pandemic.^{19,20} However, little is known about adherence to PPE use among home care workers in usual care during COVID-19. Therefore, this study assessed the adherence to PPE use among nationwide home care service agencies during COVID-19 in Japan and explored whether it is associated with an agency-level strategy toward IPC.

Home Care Service in Japan

The Japanese government launched the Long-term Care Insurance (LTCI) system in 2000, under which people age 40 years or older must pay premiums. Those age 40–64 years with specified diseases or those age 65 years or older with a care need certification for ADL can use long-term care services in the LTCI system.²¹ Home care service is a part of the in-home service under the LTCI, in which home care workers provide assistance with ADL or IADL in recipients' homes by changing clothes, moving them, helping them eat, taking them to the toilet, bathing them, preparing meals, shopping for them, laundering, overseeing medication management, and watching their homes and other properties.²² Home care service agencies are mandated to meet the following criteria and should be designated by the prefectural governor: have full-time equivalent number of home care workers ≥ 2.5 , with one assigned in-charge of service delivery, and have a full-time dedicated administrator. Some home care workers are national licensed certified care workers, while others qualified after completing the levels of training in the content required by the LTCI law (59 hours, 130 hours, and 450 hours). In 2019, there were 508,000 care workers, 220,000 (43%) of which were certified, and 34,825 agencies provided home care services for 1.17 million users.²³

Methods

Study Design

A cross-sectional online survey was conducted in January and February of 2021, when the third wave of the COVID-19 pandemic occurred in Japan. The request letters for participation in the survey with survey URL and QR codes were mailed to 2000 home care service agencies (48 returned because of missing addresses), selected through stratified random sampling in 47 prefectures from all 33,575 nationwide agencies deemed operational by the Information Publication System for Long-term Care database of the Ministry of Health, Labor, and Welfare.²⁴ The database used in this study covered 96.4% of all agencies since 34,825 agencies opened as of 2019.²³ To assess the

infection and prevention practices and patient safety management at the agency level among home care service agencies, we developed original questionnaire items according to existing instruments and policies. The contents were validated by experts in home health care and nursing. The administrator of each agency was asked to complete the questionnaire via the study website. The survey was anonymous, and participants signed an informed consent form on the first page of the online survey to participate in the study.

Adherence to PPE Use

For PPE use, we asked questions about wearing PPE (masks, disposable gloves, and disposable aprons) when changing diapers, using a 5-point Likert scale (always–never). Standard precautions recommended in the guidelines, regarding adherence to PPE use among care workers, include always wearing mask, gloves, and apron during diaper change.^{6,19,25,26} We defined care workers' adherence to PPE use as always wearing a mask, gloves, and apron during diaper change.

Agency-Level Action toward IPC

We used the following 9 items to assess IPC strategy: (1) whether a monitoring system for infectious disease outbreaks among service users existed, (2) whether a manual for IPC existed, (3) whether a committee for IPC was established, (4) whether a representative was assigned for infection control, (5) whether appropriate information was exchanged with other agencies regarding IPC, (6) training staff about IPC, (7) evaluation of hand hygiene compliance among nursing staff, (8) provision of portable alcohol hand sanitizers to staff, and (9) monitoring the results of vaccination and antibody titer test for staff. These are almost the same as the items used in a prior survey of home care nursing agencies that was conducted in March 2020.¹⁸

Agency Characteristics

We obtained information on organizational characteristics, service provision, and administrator characteristics. For organizational characteristics, we used years since establishment, agency ownership, number of full-time equivalent care workers, status of other long-term care and/or medical services within the organization such as other home care services agencies, other long-term care services agencies, and medical institutions. For the service provision related variable, we used the provision of night-time and holiday services, action to quality management, such as obtaining user opinions, and third-party evaluations. For the administrator characteristics, we used certification of care workers or nurses and years of experience as an administrator.

Statistical Analyses

First, a summary of agency characteristics and adherence to PPE use is described. To compare agency-level action toward IPC and other agency characteristics between agencies with or without full adherence, we conducted χ^2 or Fisher exact tests for categorical variables or Mann-Whitney U tests for numerous variables. Logistic regression analysis was applied to investigate the association between agency-level action toward IPC and adherence to PPE use. In the multivariate logistic model, selected variables (ie, monitoring infectious disease outbreaks, with several home care service agencies within the same organization, night-time service provision, and administrator with certification of care worker) whose univariate test had a *P* value of less than .25, were included in the analysis.²⁷ Hosmer–Lemeshow tests were conducted for goodness of fit for the logistic regression

models. Significance was set at $P < .05$. All analyses were performed using Stata v 16 (StataCorp).

Ethical Approval

The protocol was approved by the Medical Research Ethics Committee of Tokyo Medical and Dental University. (no. M2020-282).

Results

A total of 240 questionnaires were answered. After making some exclusions because of missing data, 197 agencies were included in the analysis (response rate: 10.1%). Among them, approximately one-half were for profit. Within the same organization, the percentages of other home care service agencies, other long-term care service agencies, and medical institutions were 55.8%, 24.9%, and 7.1%, respectively (Table 1). Compared with nationwide statistics obtained from the Survey of Institutions and Establishments for Long-term Care in 2019, our participant characteristics were similar to those of all nationwide agencies (Supplementary Table 1).

Although 145 (73.6%) agencies answered that they always used both masks and gloves during diaper change, only 32 (16.2%) fully adhered to wearing masks, gloves, and apron, according to the specified guidelines (Figure 1). Table 1 shows that approximately 80% or more of the agencies monitor infectious disease outbreaks, have a manual for IPC, conduct staff training for IPC, and provide portable alcohol hand sanitizer to staff. Compared with those not adhering to PPE use, agencies adhering to PPE use are more likely to monitor infectious disease outbreaks. Adherence to PPE use was significantly associated with monitoring infectious disease outbreaks among service users (adjusted odds ratio: 5.97, 95% confidence interval: 1.30–27.31, $P < .05$; Table 2). Some organizational variables, nighttime service provision, without other home care service agencies within the same organization, and with administrators without certification of care workers, are related to adhering to PPE use (nonsignificant; Table 2 and Supplementary Table 2).

Discussion

To the best of our knowledge, this is the first nationwide survey to investigate adherence to PPE use among home care service agencies during the third wave of the COVID-19 pandemic in Japan. This study shows low adherence to PPE protocols, especially regarding the use of aprons. Using only gloves and masks during diaper change to reduce the risk of exposure to urine or stool is common among home care service agencies. Enforcing apron use remains a challenge. This finding confirms a trend similar to that before the pandemic. A study on home care nursing agencies conducted before the COVID-19 pandemic in Japan showed that compliance with wearing an apron or gown during diaper changes is relatively less common than following protocols for use of gloves or masks.¹⁸ Encouraging apron use was a challenge even before COVID-19 and remains a common problem among home care nurses. The global trend in adherence to PPE use among home care workers before and after the pandemic is unclear because there is a lack of evidence before the pandemic. An international comparison (Argentina, Canada, China, Germany, Greece, Italy, Japan, Mexico, Norway, Portugal, Spain, the UK, and the US) study indicates that health professionals' adherence to PPE use in Japan, when in contact with unsuspected or suspected patients with COVID-19, is ranked almost median (20% for unsuspected COVID-19 cases and 60% for suspected COVID-19 cases) among the 13 countries.¹³ This suggests that the need for encouraging PPE use may be a common issue in other countries.

Low adherence to PPE use may be explained by its availability and lack of sufficient knowledge and appropriate attitudes toward appropriate PPE use.⁸ Cost burden and PPE supply itself are the obstructive factors to PPE availability. In a previous study conducted in a long-term care facility, the administrator highlighted the cost of burden.²⁸ Home care service agencies, which are smaller and more nonmedical, are even more cost-conscious. However, the Japanese government paid up to 534 000 JPY (~\$4700 USD) to home care service agencies to purchase PPE as a special dispensation during COVID-19.²⁹ Cost consciousness may not be a concern compared with the situation before COVID-19. In comparison, PPE shortage may be serious during COVID-19. Qualitative studies in the US found that home health care workers were concerned about access to PPE owing to the shortages.^{15,16} Even in hospital settings, a low adherence rate to PPE caused by a shortage has been reported.^{14,30} As mentioned above, Japan also faced a serious PPE shortage,³¹ which may have led to the low adherence rate in this study.

Failure to recognize the need for aprons might be more strongly associated with low adherence to apron use protocols. The Ministry of Health, Labor, and Welfare in Japan emphasized the consistent use of disposable gloves and aprons during diaper changes for care workers as a standard precaution since before the COVID-19 pandemic.¹⁹ In this study, most agencies had access to manuals and received training for IPC. This suggests that the content of manuals or training guidelines or both may have been insufficient regarding appropriate PPE use, especially related to aprons. Further studies are necessary to fully analyze the association between the detailed contents of manuals and training for IPC and home care workers' acknowledgment of and compliance with protocols for apron use.

Our study also found that monitoring infectious disease outbreaks among service users is significantly associated with adherence to PPE use after adjusting for agency characteristics. Existing manuals and training opportunities are not correlated with adherence to protocols. A key to the success of IPC in home care settings is the description of how agencies collect infection data and how data are employed for process and quality improvement.¹² Establishing surveillance in home care agencies has been an ongoing issue for a decade.^{17,32} The fact that home care service agencies operate without medical professionals, and that they identify infections and monitor outbreaks among their service users, indicates a high level of IPC awareness. This suggests that these agencies are not simply creating manuals or training systems as a structure, but are implementing effective processes of IPC practice, such as ensuring full PPE use and monitoring infection outbreaks. The World Health Organization also emphasized that these points are the core components for IPC in primary care.³³ For home care workers to practice IPC appropriately, it is important that they are supported at the agency level.³ Appropriate agency-level strategies for IPC are crucial. However, the interpretation of this finding requires careful consideration because this result was reported with a wide confidence interval (1.30–27.31). This indicates a low level of precision for the odds ratio (5.97) regarding monitoring infectious disease outbreaks among service users and their adherence to PPE use. Further studies with larger sample sizes are necessary to provide robust evidence to boost adherence to PPE use in home care settings.

Some limitations of this study should be acknowledged. First, this survey asked administrators to answer self-reported adherence to PPE use among their home care workers on behalf of the agency. There might be differences between home care worker recognition of PPE use and/or actual adherence of home care workers. In addition, our results might overestimate adherence to PPE use owing to social desirability bias, and appropriate PPE use is obviously key to IPC. Nevertheless, this low adherence rate is more indicative of the seriousness of the problem. Further studies are necessary to determine individual actual activities and associations with individual factors

Table 1
Characteristics of Home Care Agencies

| | Total (n = 197) | | Adherence to PPE Use | | | | P |
|--|-----------------|--------|----------------------|----------|--------------|----------|------|
| | | | No (n = 165) | | Yes (n = 32) | | |
| Organizational characteristics | | | | | | | |
| Years since establishment (median, 25th–75th percentile) | 13 | 5.8–19 | 12.4 | 5.7–18.2 | 14.3 | 9.8–20.8 | .391 |
| Ownership (n, %) | | | | | | | |
| Profit | 101 | 100.0 | 86 | 85.1 | 15 | 14.9 | .733 |
| Social welfare corporation | 45 | 100.0 | 36 | 80.0 | 9 | 20.0 | |
| Others | 51 | 100.0 | 43 | 84.3 | 8 | 15.7 | |
| Number of full-time equivalent care workers (median, 25th–75th percentile) | 5 | 3–8 | 5 | 3–8 | 4.1 | 3–6.9 | .267 |
| With several home care services agencies within the same organization (n, %)* | | | | | | | |
| No | 87 | 100.0 | 68 | 78.2 | 19 | 21.8 | .058 |
| Yes | 110 | 100.0 | 97 | 88.2 | 13 | 11.8 | |
| With other long-term care services agencies within the same organization (n, %) | | | | | | | |
| No | 49 | 100.0 | 42 | 85.7 | 7 | 14.3 | .668 |
| Yes | 148 | 100.0 | 123 | 83.1 | 25 | 16.9 | |
| With a medical institution within the same organization (n, %) | | | | | | | |
| No | 183 | 100.0 | 154 | 84.2 | 29 | 15.8 | .585 |
| Yes | 14 | 100.0 | 11 | 78.6 | 3 | 21.4 | |
| Service provision | | | | | | | |
| Twenty-four-h service provision | | | | | | | |
| No | 65 | 100.0 | 58 | 89.2 | 7 | 10.8 | .144 |
| Yes | 132 | 100.0 | 107 | 81.1 | 25 | 18.9 | |
| Night-time service provision (n, %) | | | | | | | |
| No | 92 | 100.0 | 83 | 90.2 | 9 | 9.8 | <.05 |
| Yes | 105 | 100.0 | 82 | 78.1 | 23 | 21.9 | |
| Holiday service provision (n, %) | | | | | | | |
| No | 25 | 100.0 | 20 | 80.0 | 5 | 20.0 | .586 |
| Yes | 172 | 100.0 | 145 | 84.3 | 27 | 15.7 | |
| Taking action to understand the views of users (n, %) | | | | | | | |
| No | 97 | 100.0 | 80 | 82.5 | 17 | 17.5 | .631 |
| Yes | 100 | 100.0 | 85 | 85.0 | 15 | 15.0 | |
| Third-party evaluations (n, %) | | | | | | | |
| No | 154 | 100.0 | 131 | 85.1 | 23 | 14.9 | .346 |
| Yes | 43 | 100.0 | 34 | 79.1 | 9 | 20.9 | |
| Administrator characteristics | | | | | | | |
| With certification of care worker (n, %) | | | | | | | |
| No | 23 | 100.0 | 16 | 69.6 | 7 | 30.4 | .050 |
| Yes | 174 | 100.0 | 149 | 85.6 | 25 | 14.4 | |
| With certification of registered nurse (n, %) | | | | | | | |
| No | 190 | 100.0 | 159 | 83.7 | 31 | 16.3 | .886 |
| Yes | 7 | 100.0 | 6 | 85.7 | 1 | 14.3 | |
| Years of experience as an administrator (median, 25th–75th percentile) | 4.5 | 2–10 | 4 | 2–9.5 | 7 | 3–11 | .085 |
| Agency-level strategy toward IPC | | | | | | | |
| Monitoring infectious disease outbreaks | | | | | | | |
| No | 40 | 100.0 | 38 | 95.0 | 2 | 5.0 | <.05 |
| Yes | 157 | 100.0 | 127 | 80.9 | 30 | 19.1 | |
| Having a manual for infection prevention | | | | | | | |
| No | 17 | 100.0 | 14 | 82.4 | 3 | 17.6 | .870 |
| Yes | 180 | 100.0 | 151 | 83.9 | 29 | 16.1 | |
| A representative assigned as an infection control professional | | | | | | | |
| No | 127 | 100.0 | 107 | 84.3 | 20 | 15.7 | .799 |
| Yes | 70 | 100.0 | 58 | 82.9 | 12 | 17.1 | |
| Having a committee for infection prevention | | | | | | | |
| No | 157 | 100.0 | 132 | 84.1 | 25 | 15.9 | .759 |
| Yes | 39 | 100.0 | 32 | 82.1 | 7 | 17.9 | |
| Exchanging information regarding IPC with other agencies | | | | | | | |
| No | 85 | 100.0 | 74 | 87.1 | 11 | 12.9 | .274 |
| Yes | 112 | 100.0 | 91 | 81.3 | 21 | 18.8 | |
| Training staff for infection prevention | | | | | | | |
| No | 31 | 100.0 | 25 | 80.6 | 6 | 19.4 | .609 |
| Yes | 166 | 100.0 | 140 | 84.3 | 26 | 15.7 | |
| Evaluation of hand hygiene compliance among nursing staff | | | | | | | |
| No | 75 | 100.0 | 62 | 82.7 | 13 | 17.3 | .745 |
| Yes | 122 | 100.0 | 103 | 84.4 | 19 | 15.6 | |
| Provision of portable alcohol hand sanitizer to staff | | | | | | | |
| No | 10 | 100.0 | 8 | 80.0 | 2 | 20.0 | .741 |
| Yes | 187 | 100.0 | 157 | 84.0 | 30 | 16.0 | |
| Monitoring for results of vaccination and antibody titer test for staff | | | | | | | |
| No | 62 | 100.0 | 51 | 82.3 | 11 | 17.7 | .699 |
| Yes | 135 | 100.0 | 114 | 84.4 | 21 | 15.6 | |

χ^2 , Fisher exact, or Mann-Whitney U tests.

*An organization has 2 or more home care service agencies.

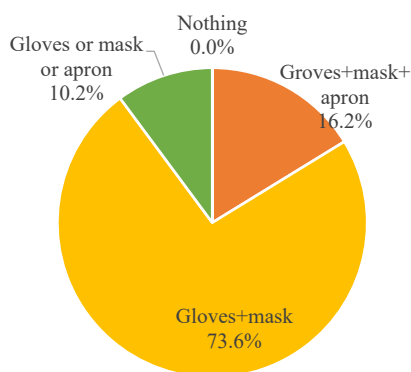


Fig. 1. Percentage of personal protective equipment use during diaper change (n = 197).

and agency-level strategies. A direct observation by infection control specialists and/or remote cameras will be helpful in obtaining more valid information to assess the adherence to PPE use. Second, the low response rate (approximately 10%) may limit the generalizability of the results. The low response rate may be because most administrators in home care service agencies were struggling to deal with the surging number of COVID-19 cases across the nation during the study period. This is response rate is similar to surveys conducted during the first wave of the COVID-19 pandemic in Japan.¹⁸ Contrastingly, the characteristics of the agency (Supplementary Table 1) are generally consistent with those of the national survey. The current results can describe the nationwide situation. Third, as mentioned above, larger sample sizes are needed to provide robust conclusions in future studies.

Conclusions and Implications

Low adherence to PPE use, especially apron use, during diaper change was revealed among home care service agencies during COVID-19 in Japan, despite the widespread availability of the manual for IPC and/or training opportunities. Adherence to PPE use is associated with existing monitoring systems as one of the agency-level actions toward IPC. To ensure safety and quality home care services for both users and home care workers, agencies should not simply create manuals or training systems as a structure; instead, they should implement effective processes of IPC practice, such as ensuring full PPE use and monitoring of infection outbreaks. Continuous financial support and dissemination for appropriate PPE use in the entire home care setting is necessary.

Table 2
Result of Multivariate Logistic Regression Analysis for Adherence to PPE Use (n = 197)

| | aOR | 95% CI | | P |
|---|------|--------|-------|------|
| Monitoring infectious disease outbreaks (ref. not) | 5.97 | 1.30 | 27.31 | <.05 |
| With several home care services agencies within the same organization (ref. not)* | 0.48 | 0.22 | 1.09 | .079 |
| Night-time service provision (ref. not) | 2.24 | 0.95 | 5.28 | .066 |
| Administrator with certification of care worker (ref. without) | 0.37 | 0.12 | 1.09 | .072 |

aOR, adjusted odds ratio; CI, confidence interval.

Hosmer-Lemeshow test: $P = .273$.

*An organization has 2 or more home care service agencies.

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Supplementary Table 1

Comparison Between the Study Sample and National Statistics

| | Final Study Sample (Complete Case) | | Study Participants | | Survey of Institutions and Establishments for Long- Term Care in 2019* | |
|------------------------------|---------------------------------------|------|--------------------|------|--|------|
| | n = 197 | | n = 240 | | n = 34,825 | |
| Region | | | | | | |
| Hokkaido | 9 | 4.6 | 12 | 5.0 | 1621 | 4.7 |
| Tohoku | 14 | 7.1 | 17 | 7.1 | 2303 | 6.6 |
| Kanto | 56 | 28.4 | 63 | 26.3 | 9459 | 27.2 |
| Chubu | 34 | 17.3 | 42 | 17.5 | 4509 | 12.9 |
| Kinki | 46 | 23.4 | 54 | 22.5 | 9486 | 27.2 |
| Shikoku and Chugoku | 17 | 8.7 | 23 | 9.6 | 3184 | 9.1 |
| Kyusyu and Okinawa | 21 | 10.7 | 23 | 9.6 | 4263 | 12.2 |
| Missing | - | - | 6 | 2.5 | - | - |
| Agency ownership | | | | | | |
| Profit | 101 | 51.3 | 115 | 47.9 | 23,627 | 67.8 |
| Social welfare corporation | 45 | 22.8 | 59 | 24.6 | 5852 | 16.8 |
| Others | 51 | 25.9 | 57 | 23.8 | 5341 | 15.3 |
| Missing | - | - | 9 | 3.8 | - | - |
| 24-h service provision | 132 | 67.0 | 156 | 71.6 | 11,069 | 32.5 |
| Night-time service provision | 105 | 53.3 | 125 | 56.8 | 19,053 | 56.0 |
| Holiday service provision | 172 | 87.3 | 189 | 85.9 | 28,023 | 82.3 |

*Survey of Institutions and Establishments for Long-term Care was conducted by the Ministry of Health, Labour and Welfare, and targeted all of the institutions and establishments in the Long-Term Care Insurance system in Japan.

Supplementary Table 2

Results of Univariate Logistic Regression Analysis for Adherence to PE Use

| | OR | 95% CI | | P Value |
|---|------|--------|-------|---------|
| Infection prevention and control practice | | | | |
| Monitoring infectious disease outbreaks (ref. not) | 4.49 | 1.03 | 19.65 | .046 |
| Having a manual for infection prevention (ref. not) | 0.90 | 0.24 | 3.32 | .870 |
| A representative assigned as an infection control professional (ref. not) | 1.11 | 0.51 | 2.42 | .800 |
| Having a committee for infection prevention (ref. not) | 1.16 | 0.46 | 2.91 | .760 |
| Exchanging information regarding IPC with other agencies (ref. not) | 1.55 | 0.70 | 3.43 | .276 |
| Training staff for infection prevention (ref. not) | 0.77 | 0.29 | 2.07 | .610 |
| Evaluation of hand hygiene compliance among nursing staff (ref. not) | 0.88 | 0.41 | 1.91 | .745 |
| Provision of portable alcohol hand sanitizer to staff (ref. not) | 0.76 | 0.15 | 3.78 | .742 |
| Monitoring for results of vaccination and antibody titer test for staff (ref. not) | 0.85 | 0.38 | 1.90 | .699 |
| Organizational characteristics | | | | |
| Years since establishment | 1.02 | 0.97 | 1.07 | .468 |
| Ownership (ref. for profit) | | | | |
| Social welfare corporation | 1.43 | 0.57 | 3.57 | .440 |
| Others | 1.07 | 0.42 | 2.71 | .892 |
| Log (Number of full-time equivalent care workers) | 0.61 | 0.29 | 1.26 | .179 |
| With several home care services agencies within the same organization (ref. not)* | 0.48 | 0.22 | 1.04 | .062 |
| With other long-term care services agencies within the same organization (ref. without) | 1.22 | 0.49 | 3.02 | .669 |
| With a medical institution within the same organization (ref. without) | 1.45 | 0.38 | 5.51 | .587 |
| Service provision | | | | |
| Twenty-four-h service provision (ref. not) | 1.94 | 0.79 | 4.75 | .149 |
| Night-time service provision (ref. not) | 2.59 | 1.13 | 5.93 | .025 |
| Holiday service provision (ref. not) | 1.34 | 0.46 | 3.89 | .587 |
| Taking action to understand the views of users (ref. not) | 0.83 | 0.39 | 1.77 | .631 |
| Third party evaluations (ref. not) | 1.51 | 0.64 | 3.56 | .348 |
| Administrator's characteristics | | | | |
| With certification of care worker (ref. without) | 0.38 | 0.14 | 1.03 | .056 |
| With certification of registered nurse (ref. without) | 0.85 | 0.10 | 7.35 | .886 |
| Years of experience as an administrator | 1.00 | 0.99 | 1.02 | .602 |

*An organization has 2 or more home care service agencies.