The Public Health Center’s Targeted Guidance on Infection Control Practices by Hospitals Regarding Multidrug-resistant Organisms in Japan

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Abstract

Introduction

The study conducted by the Kawaguchi City Public Health Center (PHC) in 2023 on hospital infection control (IC) programs revealed that hospitals can improve their IC programs if the PHC provides training sessions (TSs) that have numerical effects. In this study, we expected that we could help hospitals develop their IC practices by providing targeted guidance. This study aimed to clarify targeted guidance on IC practices and TSs programs to develop hospitals’ IC programs on multidrug-resistant organisms (MDROs) by examining hospitals’ IC programs in reference to the study conducted in 2023 and other case reports.

Methods

The Kawaguchi City PHC conducted TSs for 19 hospitals and eight affiliated clinics (AFs) with beds in June 2022, providing IC guidelines and IC practices on MDROs. Following the TSs, we emailed these hospitals and AFs with beds (hospitals) a questionnaire about current IC policies and about planned policies, hand hygiene compliance programs (HHCPs), useful information on TSs by the PHC, and the IC programs that the facilities intended to implement in the future or develop (to be developed). We examined the relationship between useful information and IC programs to be developed and the survey results in this study in reference to a study conducted in 2023, along with other case reports.

Results

Seventeen hospitals and six AFs with beds responded to the survey, with a response rate of 85.2%. IC policies for methicillin-resistant Staphylococcus aureus (MRSA) were prepared by 21 hospitals (91.3%), whereas only five hospitals (21.7%) had prepared IC policies for carbapenem-resistant Enterobacteriaceae. Regarding the HHCPs, an increase in the availability of alcohol-based hand sanitizer was identified by 17 (75.9%) hospitals, posters or symbols by 13 hospitals (56.5%), TS by 12 hospitals (52.2%), hand sanitizer by 12 hospitals (52.2%), and an assessment of HH compliance and provision of feedback by nine hospitals (39.1%). Nine hospitals (39.1%) identified HHCPs and environmental cleaning (EC) for carbapenemase-producing Enterobacteriaceae (CPE) as useful information. The association between the TSs on HHCPs and HHCPs to be developed was statistically significant (p = 0.027). Meanwhile, the information on EC for CPE was significantly associated with staff cohorting to be developed (p = 0.007). The TS programs were not significantly connected to EC, nor were with TSs to be developed.

Conclusions

The PHC should recommend that hospitals examine whether their HHCPs could contribute to developing HH compliance. The PHC needs to provide the hospitals with information that supports the hospitals’ development of EC training and effective, specific TS programs to develop EC or TSs and conduct a survey on the barriers to implementing staff cohorting. We suggest TSs programs, including quantified information on HHCPs and ECs such as the target of the HH compliance improvement rate and the increased possibility of CPE identification assuming CPE had previously identified in the toilet of the patient’s room, could contribute to developing IC programs such as HHCPs and staff cohorting. We conclude the PHC should continue providing hospitals with targeted guidance on IC practices and TSs programs that are effective in helping hospitals develop IC programs.

Categories: Epidemiology/Public Health, Infectious Disease

Keywords: infection control practices, guidance, useful information, multidrug-resistant organisms, public health center, training session
Introduction

In the United States, local public health departments are implementing infection control (IC) strategies in facilities with high rates of carbapenem-resistant Enterobacteriaceae (CRE) to prevent CRE infections [1]. In Japan, the central offices of local public health departments or public health centers (PHCs) routinely visit hospitals and affiliated clinics (AFs) with beds (hospitals) as mandated by the Japanese Medical Care Act. There were 32 hospitals in Kawaguchi city in June 2022. Routine visits to these hospitals by the Kawaguchi PHC revealed that most of them had not prepared written IC policies for multidrug resistant organisms (MDROs) and had not developed hand hygiene compliance programs (HHCPs) [2]. Since 2020, however, approximately 2,000 cases of CRE have been notified to the Japanese public health authorities [3]. In addition, the identified CRE cases reported by 25% of Japan’s hospitals numbered over 9,000 [3]. Therefore, the Kawaguchi PHC concluded that information about preventing the spread of CRE infection should be provided, not only to the hospitals in which CRE has been identified but also to those where it has never been identified [2].

Kawaguchi, located near Tokyo, lacks university hospitals and only has a few infection preventionists [2]. Therefore, it can be challenging for the hospital personnel in Kawaguchi to access advice from IC specialists [2]. Local public health authorities have not reported whether the information provided by them on IC had any effect on IC programs implemented by the hospitals, so to address the lack of information in Kawaguchi, we decided to examine whether training session (TS) programs provided by the PHC have had any effect on the development of IC programs created by the hospitals [2]. In June 2022, the Kawaguchi PHC provided hospitals with TSs on IC guidelines and practices, focusing specifically on MDROs, followed by a survey of the IC programs by the hospitals [4].

We mentioned the results of this study, which was presented at the Nihon Kousyuueisei Gakkai Annual Meeting in 2022, in a related study conducted in 2023 [2]. However, we had not examined the study results in the 2022 study in relation to the impact of effective TS programs on IC programs developed by the hospitals. This situation led us to conclude that we needed to examine whether the study results conducted in 2023 were compatible with the 2022 study result to determine the generalizability of the study. Meanwhile, in the 2025 study, we planned to develop the hospital’s IC programs by providing effective TSs programs by the PHC [2]. In this study, we planned to help hospitals develop their IC practices by providing targeted guidance on hospital IC practices. In addition, we had expected that the guidance by the PHC on the IC practices offered by the hospital could be targeted by examining the 2022 study results in reference to the 2023 study results. In this current study, we aim to clarify the targeted guidance programs on IC practices and TS programs, which will be used to develop IC programs, by examining the HHCPs and IC programs in reference to the study conducted in 2023 [2] and to other case reports.

This article was previously presented as a meeting poster at the 2022 Nihon Kousyuueisei Gakkai Annual Meeting on October 8, 2022.

Materials And Methods

In June 2022, the Kawaguchi PHC conducted TS programs on IC practices for MDROs for 19 hospitals and eight AFs with beds in Kawaguchi via a web conference system facilitated by a public health physician (Table 1). The TS participants were medical doctors, pharmacists, nurses, and hospital clinical laboratory technicians. After the TS programs, we emailed a questionnaire to 19 hospitals and eight AFs with beds. In the email, we explained that the respondents’ identifying information would be removed from the questionnaire results before they were made public, and we asked for their consent to participate in our study. 17 hospitals and six AFs with beds responded to the survey. The hospitals’ responses to the questionnaire covered the following topics: preparedness for the IC written policies on MDROs and for policies the hospitals intended to prepare, HHCPs by the hospitals, IC programs that the hospitals intended to implement in the future or develop (to be developed), and useful information for hospitals that are developing IC programs (useful information).

Variables excluding the IC written policy were all summarized using the number of hospitals. The IC policy was summarized for each MDRO individually. Multiple and single regression analyses were used to determine the relationship between IC programs to be developed and useful information. Furthermore, a correlation analysis was carried out to determine the relationships between IC programs to be developed and useful information. We used BellCurve for Excel (BellCurve, Tokyo) for multiple and single regression analyses and correlation analysis. We performed a Spearman’s rank correlation coefficient for the correlation analysis. We examined the HHCPs and IC programs by the hospitals in reference to a related study conducted in 2023 and to other case reports.

The role of the PHC in Japan is to ensure safety in hospitals by guiding them to develop IC programs and practices [2]. In this study, we aimed to provide effective guidance on the IC practices and TSs to develop the IC programs for hospitals in the jurisdiction, and we analyzed the survey results that were defined as city activities in Kawaguchi by the Medical Care Act and examined them based on research report recommendations and best practices. This study involved no invasive procedures (e.g., drawing blood, collecting samples, or asking traumatic questions), and we did not intend to use human subjects. Hence, the ethics committee did not have to approve this study.
<table>
<thead>
<tr>
<th>Description</th>
<th>TS programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene compliance programs</td>
<td>The hospitals need to implement a feasible goal setting to be accepted by the staff: about 20% hand hygiene compliance rate should be increased.</td>
</tr>
<tr>
<td>IC policy on MRSA by the university hospitals including CP</td>
<td>Specific criteria for private room management for MRSA patients Specific criteria for dedicated equipment for MRSA patients To minimize patient care items and equipment in MRSA patients’ rooms To minimize the movement of patient care items and equipment from MDRA patients’ rooms</td>
</tr>
<tr>
<td>IC on MDROs</td>
<td>If MDROs, including CRE, are identified, the hospital must target IC to prevent outbreaks.</td>
</tr>
<tr>
<td>IC and practice for CRE identified (one case)</td>
<td>Management of private room, to inform the PHC, to examine if the patient was infected after admission to hospitals, to evaluate IC currently implemented, to evaluate whether transmission is occurring, to identify CRE contacts</td>
</tr>
<tr>
<td>The definition of contact of CPE</td>
<td>Roommates, having shared the same toilet, having shared the same ward, etc.</td>
</tr>
<tr>
<td>Isolation for CRE or CPE</td>
<td>If CPE is identified, the patients are isolated.</td>
</tr>
<tr>
<td>EC for CPE</td>
<td>If CPE is not identified, hospitals should consider or carry out isolation, in consideration of the potential to be involved in the outbreak, evaluation of CP, plasmid carrying the CPE gene.</td>
</tr>
<tr>
<td>CPE infection was associated with previous CPE identification in the toilet of the patient’s room. Enhanced EC of the toilet is recommended.</td>
<td></td>
</tr>
<tr>
<td>Use disposable or dedicated patient care equipment.</td>
<td></td>
</tr>
<tr>
<td>IC and CPE practice identified (more than two cases)</td>
<td>Hospitals should identify common factor between CPE cases and block the source of infection and consider or perform an environmental screening.</td>
</tr>
<tr>
<td>The clearance of CPE carriage</td>
<td>Patients with no risk factors who are readmitted more than 12 months after a positive result of CPE colonization result are required to have three negative screening swabs taken at least 24 hours apart.</td>
</tr>
<tr>
<td>Patients are required to provide negative results on two rectal swabs submitted for culture and one swab submitted for PCR.</td>
<td></td>
</tr>
<tr>
<td>Enhanced IC programs</td>
<td>Hospitals need to develop IC programs as follows:</td>
</tr>
<tr>
<td>1. Prepare for IC written policy on CRE in reference to international guidelines and disseminate them to all employees by their TS.</td>
<td></td>
</tr>
<tr>
<td>2. Develop IC practices for CRE and CPE and disseminate them to all employees by the TSs.</td>
<td></td>
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</table>

**TABLE 1: TS programs on IC on CRE and CPE by Kawaguchi PHC**

TS: training session; IC: infection control; CRE: carbapenem-resistant Enterobacteriaceae; CPE: carbapenemase-producing Enterobacteriaceae; PHC: public health center; MRSA: methicillin-resistant Staphylococcus aureus; CP: Contact precautions; MDRA: multidrug-resistant Acinetobacter; MDROs: multidrug-resistant organisms; EC: Environmental cleaning; PCR: Polymerase chain reaction.

Results
FIGURE 1: Infection control policies on MDROs (n=23)

MDROs: multidrug-resistant organisms; MRSA: methicillin-resistant *Staphylococcus aureus*; MDRP: multiple drug-resistant *Pseudomonas aeruginosa*; ESBL: extended spectrum beta-lactamases; CRE: carbapenem-resistant Enterobacteriaceae; MDRA: multidrug-resistant *Acinetobacter*. 

Data are presented as number of facilities.

Twenty-three hospitals responded to the survey for a response rate of 85.2%. IC policies for methicillin-resistant *Staphylococcus aureus* (MRSA) were prepared by 21 hospitals (91.3%), whereas 5 hospitals (21.7%) had prepared for the IC policy on CRE and 4 hospitals (17.4%) for multidrug-resistant *Acinetobacter* (MDRA) (Figure 1). Nine hospitals (39.1%) intended to prepare for the IC policy on CRE and nine hospitals (39.1%) for MDRA (Figure 1).

FIGURE 2: Hand hygiene compliance programs (n=23)

To increase hand sanitizer: to increase the opportunity to utilize hand sanitizer.

Data are presented as number of facilities.

The HHCPs by the hospitals are summarized in Figure 2. Seventeen hospitals (73.9%) reported an increase in the availability of alcohol-based hand sanitizer, making it the most frequently implemented program. Posters and symbols for HH were identified by 13 hospitals (56.5%), TSs by 12 hospitals (52.2%), carrying of hand sanitizer by staff by 12 hospitals (52.2%), and assessment of HH compliance and provision of feedback to the staff (providing feedback) by 9 hospitals (39.1%). Figure 3 provides useful information on developing hospital IC programs; IC policies on MRSA including contact precautions stipulated by the university hospital (IC policies on MRSA) were considered to be useful by 16 hospitals (69.6%). Meanwhile, environmental cleaning (EC) for carbapenemase-producing Enterobacteriaceae (CPE) was deemed useful by nine hospitals (39.1%), and HHCPs by nine hospitals (39.1%; Figure 3). The following IC programs to be developed were identified: HHCPs by 14 hospitals (60.9%), EC of the patients’ rooms by 10 hospitals (43.5%), staff cohorting of MDROs (staff cohorting) by 6 hospitals (26.1%), and TSs on MDROs IC by 6 hospitals (26.1%; Figure 4).
FIGURE 3: Useful information for developing IC programs by the hospitals (n = 23)

IC: infection control; MRSA: methicillin-resistant Staphylococcus aureus; CRE: carbapenem-resistant Enterobacteriaceae; CPE: Carbapenemase-producing Enterobacteriaceae.

Data are presented as number of facilities.

FIGURE 4: Infection control programs that hospitals intended to implement in the future or develop

MDROs: multidrug-resistant organisms; CRE: carbapenem-resistant Enterobacteriaceae.

Data are presented as number of facilities.

Table 2 shows the relationships between useful information and the IC programs to be developed. The association between useful information such as HHCPs and HHCPs to be developed was statistically significant: the regression coefficient (RC) = 0.46, p = 0.027, 95% confidence interval (CI) = 0.06-0.86. However, useful information such as IC policies on MRSA did not significantly correlate with the IC programs to be developed, such as HHCPs, EC of the patients’ room, staff cohorting, and TSs. Furthermore, the useful information "EC for CPE" was significantly associated with staff cohorting (standard partial RC = 0.55, p = 0.007, 95% CI = 0.17-0.93). A moderate correlation exists among useful information HHCPs, IC policies on MRSA, and IC for CPE, with correlation coefficients of 0.337, 0.270, and 0.337, respectively (Table 3). A strong correlation exists between the EC of the MDROs patients’ rooms and staff cohorting, with a correlation coefficient of 0.677 (Table 4).
### TABLE 2: Association between useful information for developing IC programs and IC programs that the hospitals intended to implement in the future or develop

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Independent variables</th>
<th>Multiple regression analysis</th>
<th>Single regression analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC programs that the hospitals intended to implement in the future or develop</td>
<td>Useful information for developing IC programs by the hospitals</td>
<td>Standard partial RC t value p-value 95% CI</td>
<td>RC t value p-value 95% CI</td>
</tr>
<tr>
<td>HHCPs</td>
<td>HHCPs</td>
<td>0.40</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
<td>0.06</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>EC for CPE</td>
<td>0.15</td>
<td>0.70</td>
</tr>
<tr>
<td>EC of the MDROs patients’ room</td>
<td>HHCPs</td>
<td>−0.24</td>
<td>−0.99</td>
</tr>
<tr>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>EC for CPE</td>
<td>0.26</td>
<td>1.09</td>
</tr>
<tr>
<td>Staff cohorting for MDROs</td>
<td>HHCPs</td>
<td>0.05</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
<td>−0.25</td>
<td>−1.28</td>
</tr>
<tr>
<td></td>
<td>EC for CPE</td>
<td>0.55</td>
<td>3.05</td>
</tr>
<tr>
<td>Training sessions on MDROs</td>
<td>HHCPs</td>
<td>0.05</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
<td>−0.19</td>
<td>−0.82</td>
</tr>
<tr>
<td></td>
<td>EC for CPE</td>
<td>−0.20</td>
<td>−0.95</td>
</tr>
</tbody>
</table>

IC: infection control; RC: regression coefficient; CI: confidence interval; HHCPs: hand hygiene compliance programs; MRSA: methicillin-resistant Staphylococcus aureus; CP: contact precaution; EC: environmental cleaning; CPE: carbapenemase-producing Enterobacteriaceae; MDROs: multidrug-resistant organisms.

Statistical significance determined as p ≤ 0.05.
### TABLE 3: Correlation between useful information for developing IC programs by the hospitals

IC: Infection control; HHCPs: Hand hygiene compliance programs; MRSA: Methicillin-resistant Staphylococcus aureus; CP: Contact precautions; EC: Environmental cleaning; CPE: Carbapenemase-producing Enterobacteriaceae.

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>Spearman’s rank correlation coefficient (between variable 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHCPs</td>
<td>IC policies on MRSA including CP</td>
<td>0.337</td>
</tr>
<tr>
<td>HHCPs</td>
<td>EC for CPE</td>
<td>0.270</td>
</tr>
<tr>
<td>IC policies on MRSA including CP</td>
<td>EC for CPE</td>
<td>0.337</td>
</tr>
</tbody>
</table>

### TABLE 4: Correlation between IC programs that the hospitals intended to implement in the future or develop

IC: infection control; HH: hand hygiene compliance programs; EC: environmental cleaning; MDROs: multidrug-resistant organisms.

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>Spearman’s rank correlation coefficient (between variable 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHCPs</td>
<td>EC of the MDROs-identified patients’ room</td>
<td>-0.195</td>
</tr>
<tr>
<td>HHCPs</td>
<td>Staff cohorting for MDROs</td>
<td>0.071</td>
</tr>
<tr>
<td>HHCPs</td>
<td>Training sessions on MDROs</td>
<td>-0.335</td>
</tr>
<tr>
<td>EC of the MDROs patients’ room</td>
<td>Staff cohorting for MDROs</td>
<td>0.677</td>
</tr>
<tr>
<td>EC of the MDROs patients’ room</td>
<td>Training sessions on MDROs</td>
<td>0.078</td>
</tr>
<tr>
<td>Staff cohorting for MDROs</td>
<td>Training sessions on MDROs</td>
<td>0.098</td>
</tr>
</tbody>
</table>

**Discussion**

*The Importance of Hospitals’ Preparing for IC Written Policy on MDROs*

In Japan, there are no national guidelines for IC for MDROs. Moreover, the WHO does not recommend that hospitals prepare written IC policies for MDROs [5]. Meanwhile, the EU, Australia, and some states in the United States have prepared guidelines on MDROs [6-8]. Therefore, the hospitals in these areas can prevent and control MDROs in reference to these guidelines. We suggest that the hospitals in Kawaguchi, other than the five hospitals (21.7%) that have prepared IC policies on CRE (Figure 1), would not be able to prevent and control CRE. In Japan, 12.2% of hospitalized patients were colonized with CRE [9]. In light of this information, hospitals in Kawaguchi, where CRE has never been identified, may identify CRE in the future. We suggest that Kawaguchi PHC continue to encourage the hospitals to prepare for CRE-specific IC policies. Moreover, public health authorities including the PHC (public health authorities) and IC specialists who provide the hospitals with advice on IC (IC specialists) need to recommend that hospitals prepare IC written policies on MDROs if they are not covered by the national guidelines on MDROs.

In this study, nine (39.1%) hospitals intended to prepare IC policies for CRE (Figure 1). Training in IC was favorably correlated with greater knowledge of MDROs and IC among health-care workers [10]. Therefore, we propose that participation in the TSs carried out in this study may contribute to preparing IC policies on CRE.

*Promoting HH Compliance Programs by the Hospitals*

In Japan, there are no national guidelines for HH compliance. The most important factors in the development of HH compliance are the location of the hand sanitizer location close to the room entrance...
and its easy visibility [11]. Therefore, if the hospitals increase the opportunities to use hand sanitizer (Figure 2) but do not place it at the room entrances or make it easily visible, HH compliance might not improve as they had expected. The WHO does not require staff to carry hand sanitizer and recommends that the hospitals should adapt resources effective for tailoring HH compliance for the local context [12]. In the hospitals in Japan, staffs’ policy of carrying hand sanitizer (Figure 2) increased the usage of hand sanitizer [13]. Public health authorities and IC specialists need to recommend that hospitals introduce portable hand sanitizer after examining its effectiveness for developing HH compliance.

The importance of posters about HH is emphasized by the WHO [12]. However, there is no recommendation about the contents of posters encouraging HH compliance [12]. The introduction of the Apple emoji, which is the symbol that indicates the timing of HH for hospital personnel, contributed to improved HH compliance [14]. Hospitals in Kawaguchi that post posters or symbols (Figure 2) should examine their impact on HH compliance. Public health authorities and IC specialists need to provide hospitals with advice on the effective placement of posters or symbols related to HH compliance and must guide hospitals to examine the effect of posters and symbols.

The effect of feedback on HH compliance is emphasized by the WHO [12]. However, there is no recommendation on the specific content of feedback related to developing HH compliance [12]. Specific feedback programs useful for developing HH compliance have been reported [15], [16], [17]. Therefore, public health authorities and IC specialists should recommend that hospitals examine whether their provision of feedback as currently conducted (Figure 2) could contribute to the development of HH compliance.

The TS program “the prevention of healthcare-associated infections (HAI) and cost savings by implementing cleaning bundles” resulted in a strong association with HHCPs to be developed by the hospitals [2]. The financial impact of the enhanced IC practices within the organization encourages the hospital staff to prevent the spread of MDROs [18]. Therefore, we suggest that TS programs in this study resulting in about a 20% HH compliance rate should be increased, though they are not significantly associated with developing HHCPs by multiple regression analysis (Table 2), so they might not be effective in developing HHCPs, given the lack of information on cost effectiveness. The public health authorities and IC specialists need to provide hospitals with information on the cost-effectiveness of HHCPs and should guide hospitals to provide their staff with such information.

Promotion of EC by the Hospitals

The inappropriately written EC policies developed by the hospitals whose knowledge of EC is insufficient and EC by workers at co-signed businesses (CBs) might be barriers to improving EC in hospitals in Japan [2]. Therefore, we suggest that these findings might have contributed to TS programs by the Kawaguchi PHC not related to EC as developed by the hospitals (Table 2). In Japan, there are no national guidelines for EC of MDROs. Meanwhile, the WHO has stated that it is crucial for hospitals to train cleaning staff if EC is to be improved [5]. Regarding IC for CPE outbreaks, multi-component IC measures were used including enhanced EC, and the effectiveness of multi-component IC measures has been determined [19]. Hospitals can conduct their TSs in reference to their IC policies for EC. We suggest that hospitals develop their IC policies for EC in reference to EC measures put in place during MDRO outbreaks. Public health authorities and IC specialists must provide the hospitals with information not only on EC in toilets (Table 1), but also on EC measures conducted during the outbreak to support the hospitals’ development of EC training.

Promotion of Staff Cohorting by the Hospitals

The WHO does not mention the importance of staff cohorting for prevention and control of MDROs [5]. Meanwhile, IC practices that included staff cohorting were effective in controlling an outbreak of CPE [20]. We could not find previous studies mentioning the barriers to implementing staff cohorting. We suggest that a low incidence of CRE might have resulted in only six hospitals intending to implement or develop staff cohorting (Figure 4). However, this study revealed that TS programs such as EC for CPE (the recommendation for enhanced EC of toilets) might encourage implementation of staff cohorting by the hospitals (Table 2). We suggest that the hospitals had not expected that the toilet could be the source of infection, and the TS programs on EC for CPE had prompted them to prepare for an MDROs outbreak plan by practicing staff cohorting. The public health authorities and IC specialists should conduct a survey on the barriers to implementing staff cohorting and provide the hospitals with the survey results.

Promotion of TSs on MDROs by the Hospitals

In Japan, there are no national guidelines for TSs on MDROs. However, staff training is critical for the implementation of successful MDROs control, as mentioned in the WHO guidelines [5]. The lack of specific and effective TS programs by the PHC might have contributed to TS programs by the PHC that were not related to the TSs that the hospitals intended to conduct [2]. In this study, specific effective TS programs by the PHC were not provided. The public health authorities and IC specialists must examine the effectiveness of their specific TS programs by asking why the hospitals develop TSs and why they do not, so they may provide effective information on the TSs on MDROs.

Targeted Guidance to Promote Development of IC Programs
We examined the HHCPs and IC programs offered by the hospitals in reference to a related study conducted in 2023 [2] and other case reports. The related study conducted in 2023 revealed that the TS programs provided by the PHC developed IC programs such as HHCPs and HH compliance feedback but did not result in the development of EC and TSs by the hospitals [2]. Moreover, the authors of the related study conducted in 2023 examined the reasons why the TS programs provided by the PHC were related or not related to the IC programs to be developed, and found three factors: HHCPs developed based on the effect of IC practices, barriers such as the lack of knowledge about EC, and TSs to be developed that were impeded by the lack of specific and effective TS programs [2].

The findings and case reports cited in this study provided us with several insights that enabled us to discuss the targeted guidance on IC practices by the hospitals; these include guiding hospitals to examine the effect of HHCPs, guiding hospitals to provide their staff with cost-effective HHCPs, providing hospitals with information about improving EC training, conducting a survey on the barriers to implementing staff cohorting. We suggest that the guidance programs discussed in this study could help hospitals develop IC practices using a novel method: guiding hospitals to examine the effect of HHCPs and provide their staff with cost-effective HHCPs and providing the hospitals with information for improving EC training and conducting a survey on barriers to staff cohorting. These results provided additional point of view, regarding developing IC programs on which a related article discussed the effectiveness of TS programs [2].

Providing quantified Information to Promote Development of IC Programs

In this study, the TS programs (including HHCP, whose HH compliance rate of about 20% should be increased; and EC for CPE, which recommends enhanced EC for toilet CPE infections associated with previous CPE identification) were associated with HHCPs and staff cohorting to be developed (Table 1). These TSs also featured IC practices or epidemiological findings with quantified information on HHCPs and evidence based on which the EC should be enhanced. IC programs to be developed should be linked to the provision of information about numerical effects: specific feedback that is effective for HHCPs, preventing HAI and allowing cost savings by implementing cleaning bundles, and the effect of TSs on IC, such as decreases in MDROs [2]. Therefore, we suggest that providing quantified information on IC practices or findings might contribute to the development of IC programs on MDROs by hospitals. Public health authorities and IC specialists should provide hospitals with TSs programs, including IC practices or findings on IC with quantified information, to help the development of IC programs by the hospitals.

The organizational indicator of IC practices and programs developed by the hospitals is that IC programs should be reviewed [21]. Therefore, we need to conduct a survey on preparedness for IC policies on MDROs (Figures 1), IC policies on EC, HHCPs (Figure 2), and TSs, to examine the effect of guidance and TSs programs.

Japanese National Policy on IC and the Importance of this Study

The Japanese Ministry of Health, Labor, and Welfare of Japan has established the policy that IC specialists who mainly study in the universities should address issues with IC practices in the hospitals in coordination with public health physicians [2]. However, in areas in Japan such as Kawaguchi, where there are no university hospitals, it is challenging to coordinate with IC specialists in the universities outside of their jurisdiction and be given advice on solving issues in their jurisdiction. Therefore, providing the targeted guidance on IC practices and the effective TS programs on IC programs in this study could improve the IC practices and programs offered by the hospitals in the jurisdiction where advice from IC specialists in the universities is not available.

In the United States, local public health authorities should educate the hospitals on MDROs [22]. We could not find TS programs by the local public health authorities addressing the issues with IC programs [23]. We suggest that some districts have the same issues with IC practices and programs as those revealed by this study. Therefore, targeted guidance on IC practices and TS programs on IC programs that address MDROs might enable local public health authorities to provide information on IC practices and IC programs.

Strengths and Limitations of this Study

In this study, we found that hospitals could develop their own IC programs when the PHC provided information on HHCPs and EC for CPE. Moreover, we indicated that the public health authorities and IC specialists must guide the hospitals to examine the effectiveness of the HHCPs currently being conducted. Regarding development of staff cohorting, we proposed that the public health authorities and IC specialists need to conduct a survey on the barriers to implementing staff cohorting and provide the hospitals with the survey results. Moreover, we suggested that the public health authorities and IC specialists should provide the hospitals with information on EC measures conducted during the outbreak to support the hospitals’ development of EC training. Regarding TSs by the hospitals, we suggested that public health authorities and IC specialists need to provide quantified information on HHCPs and evidence, based on which the EC should be enhanced to address IC program issues. The survey response rate in this study was relatively high (85.1%). This enabled us to collect information on IC programs by hospitals throughout the jurisdiction. We expect the...
targeted guidance program and specific, effective information on IC programs discussed in this study will help hospitals in other districts develop IC practices and programs.

This study has several limitations. First, the data collected represent only 23 hospitals in Kawaguchi and may not fully represent IC practices and programs in other regions. Second, the PHC’s policy of providing guidance and information to hospitals’ IC practices and programs was restricted to a specific set of hospitals. Third, TSs programs not related to EC might not be applicable in other districts where the CB does not implement EC [2]. Therefore, TSs programs on EC should be examined in these districts to determine the applicability of effectiveness of TS programs. Fourth, we did not examine preparedness for IC policies on MDRs or on EC, HHCPs, and TSs that are currently being conducted to determine the effect of guidance and TSs programs. Therefore, we must acknowledge that the findings and TS programs implemented in this study might not directly apply to other jurisdictions or hospitals. However, we expect the program implemented in this study, which aimed to provide the hospitals with targeted guidance on IC practices and effective TS programs developing IC programs, to serve as a model that other jurisdictions could consider and adopt. Additional surveys and evaluations in different settings will help determine the generalizability and effectiveness of the strategies used in this study.

Conclusions

This study should be examined in other districts where CBs do not implement EC, and the effect of this study should be examined. However, we can conclude that the targeted guidance on IC policies and TS programs such as HHCPs and EC for CPE, could support hospitals in developing IC practices and programs. In light of our findings, we suggest the PHC continue providing hospitals under its jurisdiction with targeted guidance on IC practices and TSs including quantified information that is effective for helping hospitals enhance their IC programs.

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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