The Public Health Center’s Targeted Guidance on the Infection Control Programs on Multidrug-Resistant Organisms and Training Session Programs to Develop Infection Control Programs by the Hospitals in Japan

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Abstract

Introduction

There were 20 hospitals and 12 affiliated clinics (AFs) with beds in Kawaguchi city in June 2022. The routine visits to these facilities by the Kawaguchi City Public Health Center (PHC), stipulated by the Japanese Medical Care Act, had revealed that most of these facilities had not prepared for infection control (IC) written policies for multidrug-resistant organisms (MDROs) and had not developed hand hygiene compliance programs (HHCPs). This study aims to assess the IC programs of hospitals in Kawaguchi city and clarify the targeted guidance programs and training session (TS) programs on developing IC programs by the hospitals.

Methods

The Kawaguchi City PHC conducted TS for 19 hospitals and eight 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 on IC written policies and those that the hospitals intended to prepare, HHCPs, useful information on TSs by the PHC (useful information), 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 reference to related articles and case reports.

Results

17 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 (34.8%) 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 (73.9%) hospitals, posting of posters or symbols by 13 hospitals (56.5%), TS by 12 hospitals (52.2%), carrying of hand sanitizer by 12 hospitals (52.2%), and assessment of HH compliance and provision of feedback by nine hospitals (39.1%). 16 hospitals (69.6%) identified IC policies on MRSA by the university hospital as useful information; HHCPs by nine hospitals (39.1%); and environmental cleaning (EC) for carbapenemase-producing Enterobacteriaceae (CPE) by nine hospitals (39.1%). The association between the TS 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 = 0.006). The TS programs were not significantly connected to EC, nor were TSs to be developed.

Conclusions

The PHC needs to recommend the hospitals to examine if 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 by the hospitals. We suggest that TS programs including information with quantity on HHCPs and EC such as the target of HH compliance rate to be increased, to be more CPE identified if previous CPE identified in the toilet of the patient’s room contribute to developing IC programs by the hospitals such as HHCPs and staff cohorting. We conclude that these guidance programs for the hospitals and TS programs effective for developing IC programs will not only develop IC programs, but also facilitate the development of IC practices by the hospitals.
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 (Kawaguchi) in June 2022. The routine visits to these hospitals by the Kawaguchi PHC had revealed that most of them had not prepared for IC written 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 Japanese public health authorities [3]. In addition, the identified CRE cases reported by 25% of Japan’s hospitals number over 9,000 [2]. Therefore, the Kawaguchi PHC concluded that the information on preventing the spread of CRE infection should be provided, not only for the hospitals in which CRE has been notified but also for those in which it has never been notified [2].

Kawaguchi, located near Tokyo, does not have 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 had not reported whether the information provided by them on IC had any effect on IC programs by the hospitals, and we decided to examine if training session (TS) programs by the PHC have any effect on the development of IC programs by the hospitals to address the lack of information in Kawaguchi [2]. The Kawaguchi PHC provided hospitals with TS on IC guidelines and practices, focusing specifically on MDROs [4]. In June 2022, we utilized web conferencing systems to conduct TSs, followed by a survey on the IC programs of these hospitals [4]. In this study, we aimed to assess the IC programs of hospitals in Kawaguchi and clarify the targeted guidance programs on IC and TS programs on developing IC programs by the hospitals by examining the survey results.

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 19 hospitals and eight AFs with beds a questionnaire. 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. Out of the total, 17 hospitals and six AFs with beds responded to the survey.

The hospitals’ responses to the questionnaire covered the following topics: preparedness for IC written policy on MDROs and those 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 developing IC programs by the hospitals (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 analysis 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 Office Excel (Microsoft, WA, USA) for basic data aggregation and multiple and single regression analysis and correlation analysis.

The role of the PHC of Japan is to ensure safety in the hospitals by guiding them to develop their IC programs [2]. The role of the hospitals is to develop their IC programs and practices to ensure safety in the hospitals [2]. In this study, we aimed to provide effective the guidance and TS to develop the IC programs by the hospitals in the jurisdiction, and we analyzed the survey results that were defined as city activities in Kawaguchi stipulated 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.
The hospitals need to implement a feasible goal setting to be accepted by the staff: about 20% hand hygiene compliance rate should be increased.

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.

If MRROs, including CRE, are identified, the hospital must target IC to prevent outbreaks.

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

Roommates, having shared the same toilet, having shared the same ward, etc.

If CRE is identified, the patients are isolated.

If CRE 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 CRE gene.

CPE infection was associated with previous CRE identification in the toilet of the patient’s room. Enhanced EC of the toilet is recommended.

Use disposable or dedicated patient care equipment.

Hospitals should identify common factor between CRE cases and block the source of infection and consider or perform an environmental screening.

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.

Patients are required to provide negative results on two rectal swabs submitted for culture and one swab submitted for PCR.

Hospitals need to develop IC programs as follows:

1. Prepare for IC written policy on CRE in reference to international guidelines and disseminate them to all employees by their TS.
2. Develop IC practices for CRE and CPE and disseminate them to all employees by the TSs.

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Training sessions programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHCPs</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 CRE is identified, the patients are isolated.</td>
</tr>
<tr>
<td>If CRE 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 CRE gene.</td>
<td></td>
</tr>
<tr>
<td>EC for CPE</td>
<td>CPE infection was associated with previous CRE identification in the toilet of the patient’s room. Enhanced EC of the toilet is recommended.</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>
</tr>
</tbody>
</table>

TS: training session, IC: Infection control, CRE: carbapenem-resistant Enterobacteriaceae, CPE: carbapenemase-producing Enterobacteriaceae, CP: Contact precautions, MRSA: Methicillin-resistant Staphylococcus aureus, 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 N

23 hospitals responded to the survey for a response rate of 85.2%. IC policies for MRSA were prepared by 21 hospitals (91.3%), while five hospitals (21.7%) had prepared for the IC policy on CRE and four hospitals (45.8%) 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

Award groups in wards: award groups in wards and departments whose hand hygiene compliance rates are high.

Data are presented as N

The HHCPs by the hospitals are summarized in Figure 2. Of the total hospitals, 17 hospitals (73.9%) reported an increase in the availability of alcohol-based hand sanitizer, making it the most frequently implemented measure. Posting posters and symbols for HH was 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 nine hospitals (39.1%). Figure 3 provides useful information on developing IC programs by the hospitals (useful information): IC policies on MRSA including contact precautions by the university hospital (IC policies on MRSA) were developed 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 (60.9%) hospitals, EC of the patients’ rooms by 10 (43.5%) hospitals, staff cohorting of MDROs (staff cohorting) by six hospitals (26.1%), and TS on MDROs IC
(TS) by six 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 N.

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 N.

Table 2 shows the relationships between useful information and the IC programs to be developed. The association between useful information "HHCPs" and HHCPs to be developed was statistically significant (regression coefficient (RC) = 0.46, p = 0.027, 95% confidence interval (CI) = 0.06-0.86). However, useful information "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 TS. Furthermore, useful information "EC for CPE" was significantly associated with staff cohorting (standard partial RC = 0.55, p = 0.007, 95% CI = 0.17-0.95). A moderate correlation exists among useful information "HHCPs," "IC policies on MRSA," and "EC for CPE," with correlation coefficients of 0.337, 0.270, and 0.337, respectively (Table 3).
<table>
<thead>
<tr>
<th>IC programs that the hospitals intended to implement in the future or develop</th>
<th>Useful information for developing IC programs by the hospitals</th>
<th>Multiple regression analysis</th>
<th>Single regression analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard partial RC</td>
<td>t value</td>
</tr>
<tr>
<td></td>
<td>HHCPs</td>
<td>0.40</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>HHCPs</td>
<td>0.46</td>
<td>1.46</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></td>
<td>EC of the MDROs patients’ room</td>
<td>HHCPs</td>
<td>-0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
<td>0.00</td>
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<tr>
<td></td>
<td></td>
<td>EC for CPE</td>
<td>0.26</td>
</tr>
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<td></td>
<td></td>
<td>Staff cohorting for MDROs</td>
<td>HHCPs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>EC for CPE</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Training sessions on MDROs</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>IC policies on MRSA by university hospitals, including CP</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>EC for CPE</td>
</tr>
</tbody>
</table>

**TABLE 2: Association between useful information for developing IC programs and IC programs that the hospitals intended to implement in the future or develop**

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.
TABLE 3: Correlation between useful information for developing IC programs by the hospitals and IC programs that the hospitals intended to implement in the future or develop

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful information for developing IC programs by the hospitals</td>
<td></td>
</tr>
<tr>
<td>HHCPs, IC policies on MRSA including CP</td>
<td>0.337</td>
</tr>
<tr>
<td>HHCPs, EC for CPE</td>
<td>0.270</td>
</tr>
<tr>
<td>IC policies on MRSA including CP</td>
<td>0.377</td>
</tr>
<tr>
<td>IC programs that the hospitals intended to implement in the future or develop</td>
<td></td>
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<tr>
<td>HHCPs, EC of the MDROs-identified patients’ room</td>
<td>-0.195</td>
</tr>
<tr>
<td>HHCPs, Staff cohorting for MDROs</td>
<td>0.071</td>
</tr>
<tr>
<td>HHCPs, Training sessions on MDROs</td>
<td>-0.335</td>
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<tr>
<td>EC of the MDROs patients’ room, Staff cohorting for MDROs</td>
<td>0.000</td>
</tr>
<tr>
<td>EC of the MDROs patients’ room, Training sessions on MDROs</td>
<td>0.078</td>
</tr>
<tr>
<td>Staff cohorting for MDROs, Training sessions on MDROs</td>
<td>0.098</td>
</tr>
</tbody>
</table>

IC: Infection control; HHCPs: Hand hygiene compliance programs; MRSA: Methicillin-resistant Staphylococcus aureus; CP: contact precaution; EC: environmental cleaning; CPE: carbapenemase-producing Enterobacteriaceae; MDROs: Multidrug-resistant organisms

Discussion

The importance of hospitals' preparing for IC written policy on MDROs

In Japan, there are no national guidelines for IC on MDROs. Moreover, the WHO does not recommend that hospitals should prepare written IC policy on 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 policy on CRE (Figure 1), could not 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. It might be proposed that Kawaguchi PHC continue to encourage the hospitals to prepare for CRE-specific IC policies. Moreover, the public health authorities including the PHC (the public health authorities) and IC specialists who provide the hospitals with advice on IC (IC specialists) need to recommend the hospitals where the national guidelines on MDROs are not covered to prepare IC written policy on MDROs.

In this study, nine (39.1%) hospitals intended to prepare IC policy 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 TS carried out in this study might contribute to preparing IC policy on CRE.

Promoting HH Compliance programs by the hospitals

In Japan, there are no national guidelines for HH compliance. The WHO does not mention where the hand sanitizer should be placed to develop HH compliance [11]. The most important factors to develop HH compliance are the hand sanitizer location close to the room entrance and making it easily visible [12]. Therefore, if the hospitals increase the opportunity to utilize hand sanitizer (Figure 2) and do not place it at the room entrances and make it easily visible, HH compliance might not develop less than they had expected. The public health authorities and IC specialists need to recommend the hospitals to place the hand sanitizer at the entrances to the patient rooms and make it easily visible. The WHO does not mention about staff carrying hand sanitizer and recommends that the hospitals should adapt resources effective in tailoring HH compliance to the local context [11]. In the hospitals in Japan, staffs’ carrying hand sanitizer (carrying hand sanitizer) (Figure 2) increased the usage of the hand sanitizer [13]. The public health authorities and IC specialists need to recommend the hospitals to introduce carrying hand sanitizer after examining the effectiveness on developing HH compliance.

The importance of posting posters on HH is emphasized by the WHO [11]. However, there is no recommendation on the contents of posters encouraging HH compliance [11]. The introduction of the Apple emoji, which is the symbol indicating the timing of HH for hospital personnel, contributed to developing HH compliance [14]. The hospitals in Kawaguchi posting posters or symbols (Figure 2) should examine their impact on HH compliance. The public health authorities and IC specialists need to provide the hospitals with
The effectiveness of the PHC’s specific TS programs. We suggest that those guidance programs discussed in developing EC training, to conduct a survey on the barriers to implementing staff cohorting, and to examine guide hospitals to provide their staff with cost-effective HHCPs, to provide hospitals with information to examine the effect of HHCPs, to develop IC programs such as HHCPs and HH compliance feedback and could not develop EC and TSs by multiple regression analysis (Table 2), so they might not be effective in developing HHCPs with the lack of information on cost-effectiveness. The public health authorities and IC specialists need to provide the hospitals with information on the cost-effectiveness of HHCPs and guide hospitals to provide their staff with such information.

Promotion of EC by the hospitals

The inappropriate written EC policy by the hospitals whose knowledge of EC are insufficient and EC by the co-signed businesses (CB) worker might be the barrier to developing EC in the hospitals in Japan [2]. Therefore, we suggest that these findings might have contributed to TS programs by the Kawaguchi PHC not related to EC being developed by the hospitals (Table 2). In Japan, there are no national guidelines for EC on MDROs. Meanwhile, WHO stated that hospitals training cleaning staff is crucial for developing EC [5]. Regarding IC on CPE outbreaks, multi-component IC measures were used including enhanced EC, and the effectiveness of multi-component IC measures has been identified [19]. We suggest that the hospitals can develop their IC policy on EC on which staff training on MDROs should be conducted, in reference to EC measures conducted in the MDROs outbreaks. The public health authorities and IC specialists need to provide the hospitals with information not only on EC in toilets (Table 2), but also on EC measures conducted in the outbreak, after collecting them, 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 including 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 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 "EC for CPE" (the recommendation on enhanced EC of the toilet) might develop 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 including staff cohorting. 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.

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 TS programs by the PHC might have contributed to TS programs by the PHC that were not related to TSs that the hospitals intended conduct [2]. In this study, specific effective TS programs were not provided. Consequently, we suggest that this lack of information in TS programs contributed to TS programs by the PHC not related to TS being developed (Table 2). The public health authorities and IC specialists need to examine the effectiveness of their specific TS programs by asking why or why not the hospitals develop TSs and provide effective information on the TSs on MDROs to be developed.

Targeted Guidance to Promote Development of IC Programs

We examined the HHCPs and IC programs by the hospitals in reference to a related study conducted in 2023 [2] and case reports. The related study conducted in 2023 revealed the TS programs provided by the PHC could develop IC programs such as HHCPs and HH compliance feedback and could not develop 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. HHCPs developed by the effect of IC practices, the barriers such as lack of knowledge on EC against EC being developed, and TSs to be developed that were impeded by the lack of specific effective TS programs [2].

These findings and case reports cited in this study provided us with the insights that enabled us to discuss the targeted guidance on IC programs by the hospitals: to guide hospitals to examine the effect of HHCPs, to guide hospitals to provide their staff with cost-effective HHCPs, to provide hospitals with information to develop EC training, to conduct a survey on the barriers to implementing staff cohorting, and to examine the effectiveness of the PHC’s specific TS programs. We suggest that those guidance programs discussed in this study develop the IC programs by the hospitals from an additional point of view, compared to findings in
Conclusions

The organizational indicator of the IC programs 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 TSs.

Japanese national policy on IC and the importance of this study from a viewpoint of national and international policies on IC

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

In the United States, local public health authorities need to educate the hospitals on MDROs [22]. We could not find TS programs by the local public health authorities addressing the issues with IC programs [7]. We suggest that some districts have the same issues with IC programs revealed by this study. Therefore, targeted guidance on IC programs and TS programs that develop programs on MDROs revealed by this study might contribute to providing information on education on IC programs by the local public health authorities.

Strengths and Limitations of This Study

In this study, we found that hospitals could develop their own IC programs when the PHC provided the information on HHCPs and EC for CPE. Moreover, we indicated that the public health authorities and IC specialists need to guide the hospitals to examine the effectiveness of their HHCPs currently 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 need to provide the hospitals with information on EC measures conducted in the outbreak to support the hospitals’ development of EC training. Furthermore, we suggested that the public health authorities and IC specialists need to provide information with quantity to address the issues of IC programs. Furthermore, we indicated that the public health authorities and IC specialists need to examine the effectiveness of their specific TS programs by asking why or why not the hospitals develop TSs. 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 that the targeted guidance program and specific effective information on IC programs in this study will not only help hospitals in other districts to develop IC programs but will also strengthen the PHC’s support for hospitals regarding implementing appropriate IC practices.

This study has several limitations. First, the data collected represent only 23 hospitals in Kawaguchi and may not fully represent IC programs in other regions. In addition, the PHC’s policy of providing the guidance and information on hospitals’ IC programs was restricted to a specific set of hospitals. Moreover, TS programs not related to EC to be developed might not be applicable in other districts where the CB does not carry out the EC. Therefore, TS programs related to EC to be developed should be examined in other districts where the CB does not carry out the EC to examine the applicability [2]. Furthermore, we did not examine preparedness for IC policy on MDROs and IC policies on EC, HHCPs, and TSs that are currently conducted to examine the effect of TS. 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 that the program implemented in this study, which aimed to provide effective guidance and TS for developing IC programs by the hospitals, could serve as a model to be examined and adopted by other jurisdictions. Additional surveys and evaluations in different settings will help determine the generalizability and effectiveness of the strategies utilized in this study.

Conclusions

Providing Information Including Quantity to Promote Development of IC Programs

In this study, the TS programs (HHCP: about 20% HH compliance rate should be increased, IC for CPE: enhanced EC and the toilet CPE infection associated with previous CPE identification) were associated with HHCPs and staff cohorting to be developed (Table 2). These TS programs also featured IC practices or epidemiological findings with quantity. IC programs to be developed were linked to the provision of information on numerical effects [2]. Therefore, we suggest that providing the information on IC practices or findings on IC with quantity might contribute to development of IC programs on MDROs by the hospitals. The public health authorities and IC specialists need to provide the hospitals with the TSs including IC practices or findings on IC with quantity to address the development of IC programs by the hospitals.

The Japanese national policy on IC and the importance of this study from a viewpoint of national and international policies on IC

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

In the United States, local public health authorities need to educate the hospitals on MDROs [22]. We could not find TS programs by the local public health authorities addressing the issues with IC programs [7]. We suggest that some districts have the same issues with IC programs revealed by this study. Therefore, targeted guidance on IC programs and TS programs that develop programs on MDROs revealed by this study might contribute to providing information on education on IC programs by the local public health authorities.

Strengths and Limitations of This Study

In this study, we found that hospitals could develop their own IC programs when the PHC provided the information on HHCPs and EC for CPE. Moreover, we indicated that the public health authorities and IC specialists need to guide the hospitals to examine the effectiveness of their HHCPs currently 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 need to provide the hospitals with information on EC measures conducted in the outbreak to support the hospitals’ development of EC training. Furthermore, we suggested that the public health authorities and IC specialists need to provide information with quantity to address the issues of IC programs. Furthermore, we indicated that the public health authorities and IC specialists need to examine the effectiveness of their specific TS programs by asking why or why not the hospitals develop TSs. 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 that the targeted guidance program and specific effective information on IC programs in this study will not only help hospitals in other districts to develop IC programs but will also strengthen the PHC’s support for hospitals regarding implementing appropriate IC practices.

This study has several limitations. First, the data collected represent only 23 hospitals in Kawaguchi and may not fully represent IC programs in other regions. In addition, the PHC’s policy of providing the guidance and information on hospitals’ IC programs was restricted to a specific set of hospitals. Moreover, TS programs not related to EC to be developed might not be applicable in other districts where the CB does not carry out the EC. Therefore, TS programs related to EC to be developed should be examined in other districts where the CB does not carry out the EC to examine the applicability [2]. Furthermore, we did not examine preparedness for IC policy on MDROs and IC policies on EC, HHCPs, and TSs that are currently conducted to examine the effect of TS. 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 that the program implemented in this study, which aimed to provide effective guidance and TS for developing IC programs by the hospitals, could serve as a model to be examined and adopted by other jurisdictions. Additional surveys and evaluations in different settings will help determine the generalizability and effectiveness of the strategies utilized in this study.
This study should be examined in other districts where CB do not carry out the EC, and the effect of this study should be examined. However, we can conclude that the targeted guidance and TS programs, including quantity, such as HHCPs and EC for CPE, can support hospitals in developing IC programs. In light of these findings, we suggest that the PHC continue providing hospitals under its jurisdiction with the targeted guidance and TS effective in developing IC programs by the hospitals, including quantity. These activities by the PHC will further facilitate the development of IC practices in these hospitals.

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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